A MODEL OF THE FOOD HYGIENE

TRANSFER PROCESS

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Abstract: Analyses of food-borne disease notification throughout the world have confirmed that there is a link between outbreaks and unsafe food handling practices in the foodservice industry. For many years industry has relied on knowledge based food hygiene education and training to prompt foodservice employees to become engaged with food hygiene and safety. However, research to date (Mathias, Riben, Campbell, Wiens, 1994; Powell et al., 1997) suggested that knowledge conveyed by traditional training courses cannot be assumed to bring about desired behavioral changes. The purpose of this research was to study the effects of training input on knowledge and attitude of foodservice employees' in Hong Kong and how these effects were translated into food hygiene and safety practice in the workplace. Baldwin and Ford's (1988) transfer process model was adopted. It was redefined; pre-disposing factors of course's relevance, trainee characteristics and work environment were retained. Training outputs were replaced with theoretical concepts of knowledge, attitude and behavior and criterion measures were included based on Kirkpatrick's (1967) four level evaluation model. A survey questionnaire was developed and distributed to foodservice employees of Chinese and Western operations in Hong Kong. 391 responses were collected and analyzed using structural equation modelling and descriptive statistics. The research established two distinct and independent relationships which are the direct relationship between knowledge and attitude, and the direct relationship between training input and behavior. Foodservice employees' perceptions of their knowledge and training input were strong but weak in their behavior and attitude. The results suggested that training is an important food hygiene and safety control tool. It is recommended that management incorporate formal training as well as refresher courses in their food safety management system. Although knowledge was affirmed to affect attitude but a "gap" exist between attitude and behavior. Since the desired outcome is behavior, it is important to tap into the motivational factors and personal beliefs of foodservice employees. For relevant and effective transfer of food hygiene and safety, organization support, adequate resources and peer support are needed to produce desired effect on foodservice employees' intention and actual behavior to carry out safe working practices.

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INTRODUCTION

The Foodservice Market

The foodservice sector is one of the largest and fastest growing markets in the world. Fuelled by a greater number of women in the workforce and increasingly busy lifestyles, consumers are looking for easier meal preparation, convenience foods or dining out as alternatives. In the United States alone, a typical adult averages 5.8 restaurant visits in one week and restaurant sales has been forecasted to reach US$660.5 billion in 2013 (National Restaurant Association, 2013) contributing to 4% of U.S's GDP. In the United Kingdom, 19 million adults reported eating out at least once a week in 2013, contributing £79.7 billion to food and beverage sales (Allegra Strategies, 2013). The performance of Hong Kong's foodservice sector, hailed as the "Culinary Capital of Asia", is not much different from the rest of the world. As an industry sector, restaurant sales generated from its international and domestic markets is quite significant. In the year 2012, it recorded a total of 48.62 million visitor arrivals of which 23.77 million (48.9%) were overnight visitors and 24.84 million were same-day in-town visitors.

These two categories of visitors contributed HK$296.56 billion to total inbound tourism expenditure. Spending by these two groups of visitors on meals outside hotels was HK$20,806 million (11.2% of total spending) and HK$1,851 million (3.5% of total spending) respectively while revenue generated from hotel food and beverage sales was reported to be HK$210.03 million (Hong Kong Tourism Board, 2012). On the domestic front, eating out is almost a daily ritual of Hong Kong's culture and lifestyle; thus, expenditures on meals consumed away from home contributes quite substantially to gross domestic product. Hong Kong households spend on average a staggering 62% of their food budget on eating out (USDA, 2013). Based on 15,744 registered foodservice establishments in 2011, the value of total restaurant receipts from the industry (excluding hotel restaurants) was just over HK$89.3 billion (Hong Kong Statistical Digest of Services Sector, 2012). These figures clearly demonstrate that eating out is not only popular as a tourist activity but it is also becoming a regular domestic activity. With changing demographics and lifestyle, the need for convenience becomes increasingly important; thus, the trend for consumers to eat outside the home will continue to grow and this will be a powerful stimulant for the expansion of the foodservice market.

Food Poisoning and Foodborne Illnesses Incidences

Although seen as a thriving industry, the foodservice sector is also plagued with problems; a major one being food safety. A review conducted by Redmond and Griffith (2003) estimated that 130 million Europeans (World Health Organization, 2000), 9.4 million from the United Kingdom (Wheeler, Sethi, Cowden, Wall, 1999), 48 million Americans (Centers for Disease Control and Prevention, 2011), and 5.4 million Australians each year (Australia New Zealand Food Authority, 2013) have been affected by episodes of food-borne disease and food-related illnesses annually. Epidemiological data showed that the numbers of food poisoning

notifications have continued to increase. This may be due to improved surveillance, increased global trade and travel, changes in modern food production, modern lifestyles, changes in food consumption or emergence of new pathogens (Collins, 1997; Tauxe, 1997) but nevertheless the actual increase in numbers of food poisoning cases are significant. With greater numbers of people travelling, health concerns associated with international and domestic tourism are on the rise. A survey of 1000 adult travellers by Travel Weekly (1998) reported that 63% had experienced illnesses while on vacation with 35% being gastrointestinal or food poisoning related. The increasing number of meals consumed away from the home also meant consumers are exposed to greater risks of food poisoning as research has indicated that the majority of food poisoning cases usually occurred outside the home. Reported cases of food poisoning which contained information about the origin of infection, have shown that 70% to 80% of food poisoning incidents in U.K. were associated with catering or foodservice establishments (Bryan, 2002; Griffith, 2000). Figures released by the U.K. Food Standards Agency (FSA, 2001) stood even higher at 88%. Similar data have also been recorded in the U.S.A. For the years 1988 to 1992 the Food and Drug Administration in the U.S.A. reported 80% of food-borne illnesses occurred outside the home with full and limited service establishments implicated (Cochran-Yantis, Belo, Giampoli, McProud & Everly, 1996). More recently, data by Jones and Angulo (2006) revealed an improved but still significant level of infection where out of the 9,040 outbreaks reported to the Centers for Disease Control and Prevention (CDC) from 1998 to 2004, 4,675 (52%) were associated with restaurants or delicatessens. These statistics suggested that there was a relationship between food poisoning outbreaks and foodservice establishments.

Food Poisoning and Foodservice Establishments

Many reasons have been identified for the inherent risk of contracting food borne illnesses from foodservice establishments. The industry itself is made up of a wide range of foodservice businesses; from large scale to small and medium sized establishments (SMEs), chains to independents, hotel foodservices to fish and chips shops, fast food to haute cuisine, Italian to Chinese. As a result of the diversity in their business nature, their systems of operation are not identical. Quite often these operational systems are unique even among foodservice establishments of similar business nature. This complexity in the foodservice systems and the rarity of common uniform systems become obstacles for food hygiene management. Other reasons that have been cited were the lack of government commitment; lack of technical support; pressure from business demand; and, financial, physical and human resource constraints (WHO, 1999).

The bulk of foodservice businesses are SMEs. In the U.K., SMEs accounted for 99.8% of all food businesses within the hotel, catering and retail sector (Department of Trade and Industry, 2001) while in HKSAR, over 98% of businesses belong to small and medium business establishments (HKSAR Trade and Industry Department, Nov 2008). Research on SMEs' response to food safety legislations, conducted by Fairman and Yapp (2004), identified a list of issues which included the lack of understanding of the principles of hazard analysis and critical control point (HACCP), lack of technical knowledge to identify hazards, burdensome and overcomplicated record keeping (fundamental in many risk management systems such as HACCP), inconsistent enforcement, lack of knowledge of enforcement officers, difficulties in keeping up to date with legislation, limited availability of specialist consultancy-based intermediaries, and SMEs non membership in trade associations. Other than the above obstacles, foodservice is a labour intensive business where recruiting and retaining qualified staff has been problematic. The industry's high staff turnover and reliance on a substantial proportion of part-

time and temporary staff for its workforce has been part of the reason for insufficient investment in training and staff development initiatives. In addition poor working conditions and low pay, commonly associated with the industry failed to heighten employee's personal motivation and commitment (Crossley, 1996). Being part of a competitive industry, foodservice businesses also struggle to remain lucrative and viable and this focus on business sustainability and profitability very often takes precedence over food hygiene management system.

Based on the epidemiological data, USFDA (2009) identified five major risk factors as contributing to foodborne illness. They were improper holding temperatures', inadequate cooking, such as undercooking raw shell eggs;, contaminated equipment;, food from unsafe sources, and poor personal hygiene. Two studies investigating general outbreaks of infectious intestinal disease in England and Wales also found poor food-handling practices to be the primary causes (Djuretic, Ryan & Wall, 1996; Evans, Madden, Douglas, Adak, 1998). Lewis and Salsbury (2001) added that the five most significant practices associated with food-borne illness were improper holding temperatures, inadequate cooking, contaminated equipment, food from an unsafe source and poor personal hygiene. These findings have resulted in the National Restaurant Association Educational Foundation recommending three top key practices for ensuring safe food which were controlling for time and temperature abuse; practing good personal hygiene and preventing cross contamination (NRAEF, 2004).

In Hong Kong the Food and Environmental Hygiene Department (FEHD) is tasked with ensuring food for human consumption is safe and properly labelled. Within the FEHD, a Centre for Food Safety (CFS), which was established in 2006, is responsible for food surveillance, control, risk assessment and communication. Under its purview of food incidence and response management, the Centre reported that the number of food poisoning outbreaks ranged from 316 to 621 affecting 1056 to 2547 persons (Centre for Food Safety, 2013). Whilst the Centre does not track the origin of these outbreaks, it has been estimated that around 80% were related to food

premises and food business. Summer is the peak season in which outbreaks occurred and bacterial food poisoning has been the most prolific. The most likely causes cited were inadequate cooking, food handlers' poor personal hygiene and cross contamination either through contact with utensils or hands (HKSAR Department of Health, 2006). The Department also publishes a summary on causative agents for food poisoning outbreaks annually. Exploration of these data is helpful in summarizing food poisoning incidents in Hong Kong over the past ten years as illustrated in Table 1.1.

Table 1.1: Number of notifications for notifiable infectious diseases from 2003-2012

YEAR		**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Food poisoning	Outbreaks	422	821	972	1095	621	619	407	316	340	378
	Persons affected	2230	3131	3541	4145	1992	2537	1540	1056	1284	1529
	% change		+95%	+18%	+13%	-43%	+.3%	-34%	-22%	+8%	+11%

Source: HKSAR Dept. of Health, Centre for Health Protection, Statistics on Communicable Diseases 2003-2012.

Between the years 2003 to 2012, the figures revealed that the occurrences of food poisoning had been erractic. After the SARS outbreak in 2003, eating out picked up and food poisoning cases showed the same pattern. Leading up to the year 2006, the Asian financial crisis affected consumers' dining out patterns; dining out activities declined when the economy was bad but increased during improved economic times. But discounting the erratic years and judging by the percentage change in the number of outbreaks, the present data do not indicate a downward trend in food poisoning cases. On the contrary, it appears that food poisoning will continue to persist as a health issue in modern society. As the popularity of dining out and take-away grows, public exposure to unsafe food handling practices is likely to increase resulting in higher incidence of foodborne related illnesses.

Consequences of Foodborne Illnesses

Very often consequences of food-borne illnesses are perceived to be trivial with people falling ill and resulting in occasional deaths. The costs to an individual may include medical expenses, some loss in income, pain and suffering. To a foodservice operation, outbreaks could mean costly legal fees, medical and laboratory fees, hospitalization, medication, increased insurance premiums and possible business closure (Cochran-Yantis et al., 1996). On a larger scale, the social and economic costs of food-borne diseases can be a considerable burden to the economy of a country. In the United Kingdom medical costs have been estimated at between £500 million and £1 billion annually (Joint Food Safety Standards Group, 2000) while in the United States the economic burden of foodborne illness is $77.7 billion (Scharff, 2009). The growing magnitude and escalating costs associated with foodborne disease have prompted nations to adopt regulatory and non-regulatory preventive measures. Recommendations by the World Health Organization included strengthening food safety systems, promoting good manufacturing practices and educating retailers and consumers about appropriate food handling (WHO, 2007).

Food Safety Measures

Eradication of foodborne illnesses had become a shared responsibility among government agencies and industries. Actions taken to improve food-handling standards and to control further outbreaks included but were not restricted to legislation, food safety management systems and training. Legislation such as the Food Safety Act 1990 in the U.K. required all food business operators to:

"identify any step in the activities of the food business which is critical to ensuring food safety and ensure that adequate safety procedures are identified, implemented, maintained and

reviewed …" (EC Directive 93/43/EEC, 1993, p.97-133). To comply with legislation, foodservice establishments were prompted to develop food safety identification and assessment mechanisms. One of the more popular risk based food hygiene management system is known as hazard analysis and critical control point (HACCP). Originally developed in 1965, HACCP concentrated on developing prevention strategies in the biological, chemical and physical hazards of the food supply chain. In all the three classes of hazards, critical control points had to be identified and control procedures established to eliminate or reduce these hazards. The intention is to direct control at points in a foodservice operation that are critical to the safety of the food, establish procedures to reduce or eliminate these hazards and documentation and verification of the control procedures (Codex, 1997). Food manufacturers have used the HACCP system extensively worldwide; however, its application in the retail and foodservice sectors has been limited. The flow of food in foodservice kitchens is often more complex than with food manufacturers; thus, the identification of critical control points can be overwhelming. Very often the planning, designing and implementing of HACCP in retail and foodservice sectors requires personnel with technical expertise and organizational financial resources. Although HACCP is a well-recognized preventive system, its lack of standardized and objective measures of effectiveness and reliance on resources and technical expertise rendered it to be unpopular amongst foodservice establishments.

Food Hygiene Education and Training

Legislation also required food business operators to educate and/or provide food hygiene training. In the U.K. the Food Safety (General Food Hygiene) Regulations of 1995 stipulated that food handlers be supervised and instructed and/or trained in food hygiene that commensurate with their work activities. However there were no guidelines on the type of training and these

could be classroom based, computer based, on the job, accredited or non-accredited. Courses could be offered by bodies such as the Chartered Institute of Environmental Health, Royal Institute of Public Health and the Society of Food Hygiene Technology (Seaman & Eves, 2006). Recent New European Union hygiene regulations, which became effective in 2005-2006 required all foodservice sectors except primary producers to adopt the full HACCP system. In Australia and New Zealand, work on a national food regulatory system began in 1994. The Australia New Zealand Food Authority produced a set of national food standards based on the HACCP system to cover food safety through every stage in the food chain from farm to plate (ANZFA, 2001). An audit of the food safety legislation in Victoria found that foodservice operators had difficulty putting together food safety programmes based on HACCP and more coordination was required from the local councils (Roberts & Deery, 2004). Likewise, the U.S. FDA Food Code 2001 required that the person in charge demonstrated knowledge of foodborne disease prevention. The American National Standards Institute, which is charged with monitoring the certification assessment system has accredited programmes such as NRAEF ServSafe Food Protection Manager certification programme, Thomson Prometric Food protection Manager Certification programme and the National Registry of Food Safety Professionals Food protection Manager Certification programme.

It appeared that through legislation, training had become important ammunition in the warfare against food-borne illnesses. However shortcomings were identified in the application of HACCP. Interviews held between environmental health officers and members of the hospitality industry revealed disagreements about each other's roles and viewpoints on the HACCP hygiene management system (Adams & Morrell, 1999). The hospitality industry felt that food hygiene legislation was unclear while environmental officers felt that industry does not understand the principles of HACCP on how to produce safe food.

The lack of clear definitive guidelines on the nature of training was also partially to blame. Without key definitions and criteria, the plethora of training interventions is quite diverse. Training can range from mandatory to voluntary, home study, workshops, on the job training, part of an orientation programme to formally accredited programmes. Variations could also be found in the training programme's duration, structure, materials, qualifications of instructors and cost effectiveness. Methods to assess training interventions were also widespread which included quizzes, questionnaires, pre- and post-training tests, audits, observations and a host of other measures. Egan, Raats, Grubb, Eves (2007) undertook a literature review to identify the criteria used by researchers to evaluate the effectiveness of food safety and hygiene training. Based on the review of forty six studies they discovered 65% involved evaluation of food handlers, 24% on food managers and one study which involved both. Of these studies, 48% had some form of training intervention while the criteria for evaluating effectiveness varied from measuring knowledge to attitude and behaviour. From the series of tables that were presented in their study, a modified version consolidating all the information that involved training intervention is reproduced in Table 1.2.

Table 1.2. List of food hygiene training evaluation studies involving training intervention

Study & year	**Country**	**Participants (number)**	**Training intervention**	**Knowledge**	**Attitude, behaviour & working practices**
Cook & Casey (1979)	USA	Food service managers	NIFI course, over 5 week period	Written examination	Comparison of post-course sanitation inspection scores
Hart et al. (1996)	USA	Beef demonstrators (n=93)	National Restaurant Association SERVSAFE programme	Pre and post-training questionnaires	Pre and post-training questionnaires
McElroy & Cutter (2004)	USA	Participants (n=1448) in Statewide Food Safety Certification Program (SFSCP)	Food safety workshop (16 hrs)	Not assessed	Self reported changes in food safety behaviours assessed by questionnaire
Powell et al. (1997)	UK	Staff in 30 food premises	CIEH basic certificate in food hygiene	Basic food hygiene certificate examination	Frequency inspection ratings
Sumbingco et al. (1996)	USA	Food service employees (n=11) of university residence halls	Programmed texts for two food service tasks	Oral test	Quality of work assessed, time for doing tasks measured
Worsfold (1993)	UK	Members of the Women's Royal Voluntary Service (n=93)	Royal Society of Health Basic Food Hygiene course	Pre-course questionnaire	End-of-course evaluation
Cotterchio et al. (1998)	USA	3 groups of trainee restaurant managers (n=96)	Food manager training & certification programme	Not assessed	Routine sanitary inspection scores compared pre and post-training
Laverack (1989)	UK	Food handlers	IEHO Basic Food Hygiene course	Pre and post-training tests	Questionnaire pre and post-training
Medeiros et al. (1996)	USA	Food safety educators (n=45) and voluntary cooks (n=136)	Safe food handling for occasional cooks training programme	Pre and post-course test of 55 questions	Self-declared behaviour checklist used at time of initial training
Palmer et al. (1975)	USA	Food service managers in 31 takeout restaurants	Manager training programme (2x2h session)	Not assessed	Before and after survey of premises, total demerit score awarded
Sparkman et al. (1984)	USA	Food service workers (n=23)	Food service training manual, 3h training session	Pre and post-test with 21 multiple choice	On the job performance evaluation with 30 observations
Tracey & Cardenas (1996)	USA	Dining services division of 2 private colleges (n=76)	Two food safety training programmes	Pre and post training tests based on course training materials	Pre-training motivation assessed by survey, reactions to training surveyed immediately post-training

Table 1.2: List of food hygiene training evaluation studies involving training intervention (cont'd)

Study & year	Country	Participants (number)	Training intervention	Knowledge	Attitude, behaviour & working practices
Costello et al. (1997)	USA	Employees of 6 quick service restaurants (n=43)	Two teaching methods – lecture format or computer interactive method	Questionnaire – 25 multiple choice questions; pre and post-training tests	Not assessed
Howes et al. (1996)	Canada	Food handlers (n=69)	Home study food handler certification course	Pre and post instruction tests using 50 multiple choice questions	Pre-observation of 16 food safety practices; post-observation of two hand washing practices
Kirby & Gardiner (1997)	UK	Staff in 30 food premises	CIEH basic certificate in food hygiene	Not assessed	Pre and post-training hygiene
Nabali et al. (1986)	Bahrain	Food service managers in 24 premises	Manager training programme (2x2.5 days sessions)	Pre and post-course test of 50 questions	Pre and post-course inspection surveys of premises
Rinke et al. (1975)	USA	Food production personnel in university residence halls (n=60)	Training program presented as live instruction or taped instruction	Pre and post- training testing	Not assessed
Ehiri et al. (1997b)	Scotland	Intervention group (n=188) and comparison group (n=204) who receive no training	REHIS elementary food hygiene course	Self-administered test of 20 questions	Not assessed
Reicks et al. (1994)	USA	Leaders of home study groups (n=97)	Food safety instruction (2h lesson)	13 multiple choice questions, pre and post-instruction	Pre and post-instruction evaluation of attitudes to food safety using 5 point Likert scale
Soneff et al. (1994)	Canada	Staff at 46 community based adult care facilities	Training workshop plus manual, manual only or no intervention	Not assessed	Pre and post-training assessment of staff practices
Waddell & Rinke (1985)	USA	Food service employees (n=230) at large military hospital	Computer assisted training (CAI) and lecture method of instruction (LMI)	Pre and post-test questionnaire, 33 questions	Questionnaire to assess attitude to training using Likert scale
Wright & Feun (1986)	USA	Food service managers (n=54); study group (n=27) and control group (n1=27)	NIFI training programme	Pre and post-tests used	Pre-inspection of premises; two post inspections soon after course

Note. From "A Review of Food Safety and Food Hygiene Training Studies in the Commercial Sector" by M.B. Egan, M.M. Raats, S.M. Grubb, A. Eves, M.L. Lumbers, M.S. Dean, and M.R. Adams, 2007, Food Control, 18, p. 1183-1185. Copyright 2006 by Elsevier Ltd. Adapted with permission.

Of the forty-six studies, Egan et al. (2007) identified only twenty-two studies involved some form of training intervention. These numbers were surprisingly small given the importance placed on training to alleviate food poisoning and food-borne illnesses. Data from table 1.2 also highlighted the differences in types and levels of training interventions as well as the methods of evaluation. Due to the inconsistencies and variations in designs and outcome measures, it was not possible to draw any conclusive evidence on a particular intervention as being the most effective.

Fallacies of Food Hygiene Education and Training

Most formal and traditional food hygiene education and training programmes were based on the Knowledge, Attitudes and Practices (KAP) model. The model assumed that an individual's behaviour or practice (P) was dependent on their knowledge (K) which would eventually influence their attitude (A) and consequently behaviour. This simple theory of the cognitive learning process assumed that the provision of knowledge would enable food handlers to make safe and informed decisions about their food safety practices. To some extent this was true as training was found to be successful in increasing the level of food safety knowledge (Tebbutt, 1992; Worsfold, 1993) but a number of authors (Rennie, 1994, 1995; Ehiri et al., 1997; Howes, McEwen, Griffiths, Harris, 1996; Powell, Attwell & Massey, 1997) doubted that knowledge alone could bring about change to food handling behaviour since the KAP model did not account for cultural, social and environmental factors. Rennie (1994) in her evaluations of food hygiene education highlighted the importance of conducting training in the workplace environment in order to be conducive. Mortlock, Peters and Griffith (2000) in their survey of the U.K. food industry discovered small business size and those that employed part-time workers were at a disadvantage while Clayton (2002) identified time constraints, lack of staff and resources, poorly designed workplaces and poor management as barriers to the implementation of food safety

practices. The organizational culture of foodservice establishments especially those of the managers was also an important determinant (Worsfold & Griffith, 2003). Purportedly, a culture that is appropriate within the work environment can facilitate conditions for behavioural change. With the realization that knowledge alone does not guarantee training transfer, there was a gradual shift towards health education and psychological theory to explain food handlers' behaviour and attitude. Social cognition models (SCM) such as the 'Theory of Planned Behaviour' (Ajzen, 1991), 'Tones Health Action Model' (Tones, 1979) and 'Health Belief Model' (Janz & Becker, 1984) assumed that a person's behaviour is determined through an examination of their beliefs, attitudes and norms and that these factors needed to be examined within social and environmental conditions. These models had been used in studies such as smoking, exercise and diet (Janz & Becker, 1984: Ajzen, 1991) however their application on food handlers in an organizational context had not been extensive. Tones' Health Action model (HAM) which synthesized both the Health Belief Model and Theory of Reasoned Action proposed not only knowledge but the influence of norms, incentives to change behaviour, effects of the workplace and the opportunity to apply knowledge as important proponents for health promotion initiatives. In his review on the effectiveness and future of certification programmes, Julian (1984) commented:

> In order to change behaviour, individuals must be given the needed knowledge; they must be motivated to use it; and their environment must permit the change to occur. In addition, enforcement and other activities must be used to reinforce what is taught in the training programmes (p. 273-324).

Without a doubt when resources have been poured into training, businesses expect to see improved performances or positive outcomes especially when studies (Curry, Caplan and Knuppel, 1994; Kaufman, 2002) have shown that only 10% to 20% of skills and knowledge were applied back to the job. Although knowledge proficiency can be regarded as a positive outcome,

businesses are more interested in tangible results. In the case of foodservice businesses experiencing food safety problems, the desired outcome would be improved food hygiene behaviours, increased food sanitation and decreased risk of food poisoning. To demonstrate training has been effective, learned outcomes have to be used in the workplace. This process is known as training transfer and also sometimes referred to as learning transfer. Transfer means "to carry over" thus when applied to learning it is the carrying over of previous learning to new situations. In the job context, Broad and Newstrom (1992) defined it as "the effective and continuing application by trainees to their jobs, of the knowledge and skills gained in training-both on and off the job" (p.6). Kozlowski and Salas (1997) further added that these acquisitions of knowledge, skills, behaviours and attitudes need to be maintained over time to be of value. Thus training in the workplace is concerned not only with effective learning in a training programme but also the performance and retention of preferred behaviour.

Evidence shows that current studies on food hygiene training are void on details concerning the impact of cultural, social and environmental intervening factors. Another issue is the lack of well-defined measuring outcomes. Further work is needed to identify meaningful performance indicators that can be used to measure the effectiveness of food hygiene training. Tracey and Tews (1995) stated "training does not occur in a vacuum, but it is inextricably related to factors beyond the immediate training context." For a more critical analysis of training effectiveness, research has to look beyond content, design and implementation issues and examine the individual and work-related factors.

Food Safety in Hong Kong

Rules and regulations pertaining to food safety in Hong Kong are contained in Part V (Food and Drugs) of the Public Health and Municipal Services Ordinance (Cap.132). The main

ordinance provides for the general protection of consumers against food not of the nature, substance or quality demanded by the purchaser. Management of food incidents is under the jurisdiction of FEHD but it cooperates closely with DH to perform the following duties:

1. Inspecting food premises and investigating causes of food incidents.
2. Coordinate with government departments, local consulates, trade and the public in cases of food recall.
3. Coordinate follow up actions on public complaints and media reports on local and overseas food incidents.
4. Collect and analyze food incident data for formulation of specific food hygiene education programs for trade and community.

Like most developed countries, Hong Kong has also adopted the principles of HACCP as a food safety net. Its Food Hygiene Code sets out the regulations for business to abide, design and maintain premises in safe and hygienic condition. Chap. 5 of the Code regulates personal health hygiene and training of food handlers and stipulates that food handlers need to be trained or instructed in food hygiene and safety to a level that is appropriate to the operations they are to perform. To strengthen food hygiene supervision, FEHD introduced the Hygiene Manager (HM) and Hygiene Supervisor (HS) training scheme in 2001 which required foodservice establishments to be supervised by a person who has been certified in one of the above scheme. HM and HS are responsible for supervising the safe and hygienic conditions of food establishments and serve as the point of contact with FEHD with respect to food safety enforcement. All large food establishments and food establishments producing high risk foods are required to appoint a HM and HS while all other establishments are required to appoint either a HM or HS. A list of the types of establishments and the HM/HS requirements are produced by FEHD. Failure to do so is a breach of the licensing condition. Thus, foodservice operations either employ qualified staff or

enable staff to take part in the HM and HS training scheme. HM and HS training schemes are offered by FEHD and government appointed institutions for a minimum fee. To be certified as a HM or HS, staff needs to attend 16-20 hours of formal training culminating in a written test. FEHD also operates a Risk-based Inspection System in which health inspectors are required to conduct sanitation and food safety checks on licensed food premises and provide hygiene education during each routine inspection. Establishments found to be in breach of the Ordinance will be penalized using the Demerit Points System (DPS). The points range from 15, 10 and 5 where 15 points is awarded for offences of the highest severity. Depending on the number of suspensions within a period of 12 months, business licenses can either be suspended or cancelled. An alternative set of procedures to the DPS applicable to food establishments that have implemented ISO 22000 Food Safety Certification system was introduced in 2005. These premises are subject to inspection once every 5 months, and required to comply with the food safety code otherwise their licenses will be revoked.

In a recent audit on the operation of FEHD, the Audit Commission identified a number of deficiencies in the inspection of food premises scheme. The Commission noted that the frequency of inspections for low-risk and medium-risk food premises has been revised from once every 12 weeks and 8 weeks to once every 20 weeks and 10 weeks respectively and the number of routine inspections has decreased by 44% between 2000 and 2004. However the number of food premises related to foodborne disease investigations has increased by 43%. In its audit, it also found that as at 31 August 2005, 1.7% of licensees had not complied with the requirements of appointing a HM and/or HS (HKSAR Audit Commission, March 2006). Since the governance of safe and hygienic food that is fit for human consumption falls on the shoulders of FEHD, it needs to ensure its food safety management systems are working. With these and other reported findings by the Audit Commission, the effectiveness of its food hygiene education programmes merits an investigation.

Reviews from published English literature showed that applied research on food hygiene and safety in Hong Kong have not been very extensive as compared to those from a microbiological front. Of the closest relevance is a Masters dissertation by Mo (1996) who investigated the food handling behaviours of kitchen workers in Hong Kong using the Theory of Planned Behaviour. Findings from Mo's (1996) study revealed that the performance of some food hygiene behaviours were entirely non-volitional and depended on facilities and opportunities. He also found that the majority of kitchen workers were not properly trained in food hygiene and went on to recommend the development of intervention strategies beyond transforming individual workers but to include restaurant managers, consumers and legislative changes. As of to date, there has been limited research and study in the English literature on the effectiveness of food hygiene training transfer in Hong Kong.

Purpose of the Study

Analyses of food-borne disease notification throughout the world have confirmed that there is a link between outbreaks and unsafe food handling practices in the foodservice industry. For many years industry has relied on food hygiene education and training based on knowledge as a precautionary measure to eradicate this problem. Although knowledge in some cases has been shown to produce positive results, research also indicated that the effectiveness of such training in bringing about behavioural change has not been substantiated (Mathias, Riben, Campbell, Wiens, 1994; Powell et al., 1997). Tracey and Tews (1995) recommended more constructive research methods that looked beyond content, design and implementation issues and examine the effect of individual and work related factors. In their study, which was a review of the food hygiene training literature, Seaman and Eves (2006) proposed the inclusion of three broad categories of predisposing factors for future studies. These were:

1. Aspects of the course: the relevance or usefulness of the course to the trainee's job (Baldwin & Ford, 1988; Goldstein, 1986) and principles of the learning used (Dekker, 1982).

2. Characteristics of the trainee: self efficacy (Ford, Quinones, Sego & Sorra, 1992; Gist, Bavetta & Stevens, 1990; Tannenbaum, Mathieu, Salas, Cannon-Bowers, 1991), motivation (Mathieu et al., 1992; Noe, 1986; Tannenbaum et al., 1991), job involvement (Mathieu et al., 1992; Noe & Schmitt, 1986) and ability (Robertson & Downs, 1979).

3. Features of the work environment: managerial support (Ford et al., 1992; Huczynski & Lewis, 1980), the amount of control or autonomy available in an employee's job (Huczynski & Lewis, 1980; Vandenput, 1973) and more generally, transfer of training climate (Tracey, Tannenbaum & Kavanagh, 1995).

Also highlighted earlier was the scarcity of research that contained robust evaluations of the effectiveness of food hygiene training. Where such research has been carried out, literature showed that these studies were weak in empirical work, lacked methodological detail and outcomes were poorly defined. Although the spectrum of research on evaluation of food hygiene training effectiveness had been broad and covered an extensive time frame, deficiencies can still be observed in current studies. Based on the narrative in this chapter, these deficiencies are:

- The lack of theory guiding research and failure to examine the numerous constructs thought to affect training;
- The failure to evaluate constructs simultaneously to identify whether relationships between constructs may affect training;
- The failure to adopt a systematic framework for evaluating desired training outcomes.

To address these deficiencies, the purposes of this study are:

1. To develop a theoretical model which will simultaneously explain the relationships of training on knowledge, attitude and food hygiene behavior of foodservice employees.
2. To test the model which will explain the cause and effect relationships amongst training on knowledge, attitude and food hygiene behaviour of foodservice employees.
3. To apply this model in Hong Kong's foodservice industries to understand the conditions which facilitate or inhibit food hygiene training transfer and make recommendations for effective implementation of food hygiene education and training.

Objectives of the Study

1. To assess the structural relationship of training inputs (trainee's self-efficacy, training course relevance and work environment) on foodservice employees' knowledge, attitude and food hygiene behavior.
2. To test food hygiene knowledge as a mediating factor between training inputs and food hygiene behavior of foodservice employees.
3. To test food hygiene attitude as a mediating factor between training inputs and food hygiene behavior of foodservice employees.
4. To test the effect of knowledge on attitude in influencing food hygiene behavior.
5. To identify factors that are favorable and unfavorable to food hygiene training transfer among the different groups of foodservice operations.

6. To enhance foodservice operations diagnosis of their food hygiene management systems and enable them to reorganize their food hygiene training strategies and resources more effectively.

Significance of this study

The theoretical contribution of this study is the development of an integrated model built on prior models that can explain the effects of training inputs on foodservice employees' knowledge, attitude and behavior in food hygiene. Past models have only been able to study the effect of knowledge and attitude on behavior independently. Uniqueness of the proposed model over others is its capability to simultaneously explain the relationships between the various constructs and their effect on food hygiene behaviour. This model approaches knowledge and attitude as separate constructs in order to study their relationships with food hygiene behavior independently as well as simultaneously. Another enhanced feature of the model is its robust methodological framework with clear features of performance evaluation criterion.

This model was tested on food service employees in Hong Kong. As training transfer models do not currently exist in the foodservice industry in Hong Kong, this pioneer model serves as an evaluative tool for understanding food hygiene behavior. In particular, it attempts to establish whether knowledge or attitude would have a greater effect on behavior or whether attitude manifested by knowledge would have a greater effect on behavior. The study evaluates food handlers' current awareness of food hygiene, effectiveness of food hygiene training programs, impact of the self, training and work environment on food hygiene practices and the efficacy of government food safety initiatives. The practical contribution of this model is to assist management to identify "training transfer" gaps in their workplace; to focus on training inputs which are most effective at enhancing food hygiene knowledge, attitude and behaviour and to

rectify deficiencies, so that training resources can be consolidated and more effectively realized. By applying this model over different groups of foodservice operations, results can be compared to identify favorable and unfavorable training conditions distinctive to each type of operation. Such knowledge can facilitate group or corporate training strategies.

CHAPTER II

LITERATURE REVIEW

The purpose of this study was to understand the relationships between training inputs and knowledge, attitude and behaviour of foodservice employees. Specifically it explored the effects of training inputs on knowledge and attitude and the latter's influence on performance of behaviour at the workplace. The literature began with theories of learning and training which are central to understanding how people develop competencies to perform and function in the workplace. The focus shifted to the transfer process, an overview of transfer models and their application when examining training effectiveness. Amongst these models, Baldwin and Ford (1988) transfer process model was featured and the reasons for adapting its theoretical framework for the proposed model were discussed. The integration of social psychological theories and Kirkpatrick's four level training evaluation theory to advance the proposed model's development were mentioned. Concepts of knowledge, attitude and behaviour were defined and their relationships discussed. To complete the literature, an illustration of the proposed model with identified attributes to represent the revised constructs and their posited relationships were presented.

Learning, Training and Transfer

A brief history of transfer is worthwhile as it adds to the knowledge on how the concept was derived and its association to learning and training. Historically, learning transfer stemmed from the doctrine of formal disciplines approach, which emphasized the mind as a significant faculty that can be trained, improved and strengthened by studying certain kinds of subject matter. This approach assumed that transfer was widespread and would be fairly automatic and is best described by Rippa (1971):

> A mind so sharpened and so stored with knowledge was believed ready for any calling; indeed it was considered "trained" and equipped for life. Thus … transfer of training resulted from sharpening the faculties or powers of the mind, instead of from the specific benefits derived from a particular subject or method of study (p. 208).

Learning was said to have occurred when there is a relatively permanent change in knowledge, attitude or behaviour that occurred as a result of formal education or training or as a result of informal experiences. Training was also associated with learning, since it involved a conscious and planned activity related to the acquisition of knowledge, sharpening of skills, concepts, rules, or changing of attitudes and behaviours but it entailed an enhancement in work performance. The Manpower Services Commission (1981) glossary of training terms defined training as:

> A planned process to modify attitude, knowledge or skill behaviour through learning experience to achieve effective performance in an activity or range of activities. Its purpose, in the work situation, is to develop the abilities of the individual and to satisfy the current and future needs of the organization. (p. 62)

While there were subtle differences between learning and training, the two terms were often used interchangeably. Training, which tended to occur in the workplace, was often limited to specific

skills and operations that were with immediate application and completed in a shorter time frame than education (Van Wart et. al, 1993). In an attempt to rationalize their meanings, Nadler and Nadler, (1990: 1.18) postulated the relationship where training equals learning related to present job.

For training to be of value to a work organization, it needs to demonstrate that the knowledge, skills, behaviours and attitudes acquired have been translated into performance (Holton, Bates, Seyler and Carvalho, 1997). In other words, training is effective only when trainees can apply their learning to a work situation resulting in improved work performance. Thus, the attention on the process of learning and training gradually shifted to the transfer of learning and training. Transfer of training was defined as the application of knowledge, skills and attitudes learned from training on the job and subsequent maintenance of them over a certain period of time (Baldwin and Ford, 1988). Contained within the core concept of learning, transfer related to both process and outcome. Viewed from a generalist perspective, it was not merely the direct transfer of knowledge and skills on the job but how prior learning affects the way in which new knowledge and skills were learned and performed, at the same time encompassing a holistic process of the learner and environment.

Intuitively, learning should take place before transfer but the evaluation of training has to look beyond the learning that was gained. Learning is a means, not a primary organizational outcome (Kuchinke, 1995). When we speak about the outcome of training, it is not merely about effective learning but also the form of desirable performance especially in business practices where substantial resources have been invested into training. Georgenson, in his study (1982) reported that not more than 10% of training expenditure actually resulted in observable behavioral change on the job while Sak's (2002) survey found about 40% of trainees failed to transfer immediately after training and only 50% of training investments resulted in organizational or individual improvements. These findings indicated that there was a growing

"transfer problem" whereby newly gained knowledge, skills and abilities failed to be applied in the workplace. Such problems were often overlooked because organizations assumed transfer will automatically be translated into behavioral changes on the job (Broad & Newstrom, 1992; Olsen Jr., 1998). This notion of automatic transfer was also a common misconception in the hospitality profession (Rodriguez & Gregory, 2005). To enhance the return on training investment, research should focus on transfer and examine the factors that facilitate or inhibit its occurrence.

The Transfer Process Model

Baldwin and Ford (1988) conceptualized transfer as a process with various stages through which transfer can be tracked. This approach reflected what happened as trainees apply the knowledge or skills gained from training, practice them, discontinue their use or fail to use their skills. The three stages of the transfer process were known as training inputs, training outputs and conditions of transfer. Consistent with other major transfer studies, factors making up training input were training design, trainee characteristics and work environment characteristics. Training outputs were defined as the amount of original learning that occurred during the training programme and the retention of material after the programme was completed. The conditions of transfer included both the generalization of material learned in training to the job situation and the maintenance of learned material over a period of time on the job. When training transfer occurred, it involved the generalization of learning, trained skills and behaviours from the training environment to the work environment as well as the maintenance of these trained skills and behaviours (Baldwin and Ford, p.64). The model also stipulated the links between the inputs, outputs and conditions of transfer. The basic framework of the model is illustrated in Figure 2.1 below. Transfer was perceived to be directly affected by learning and retention (link 6), trainee characteristics (link 4) and work environment (link 5). In addition, learning and retention was

perceived to be affected by trainee characteristics (link 2), training design (link 1) and work environment (link 3). Thus the three training inputs were deemed to have an indirect effect on transfer through their impact on training outputs.

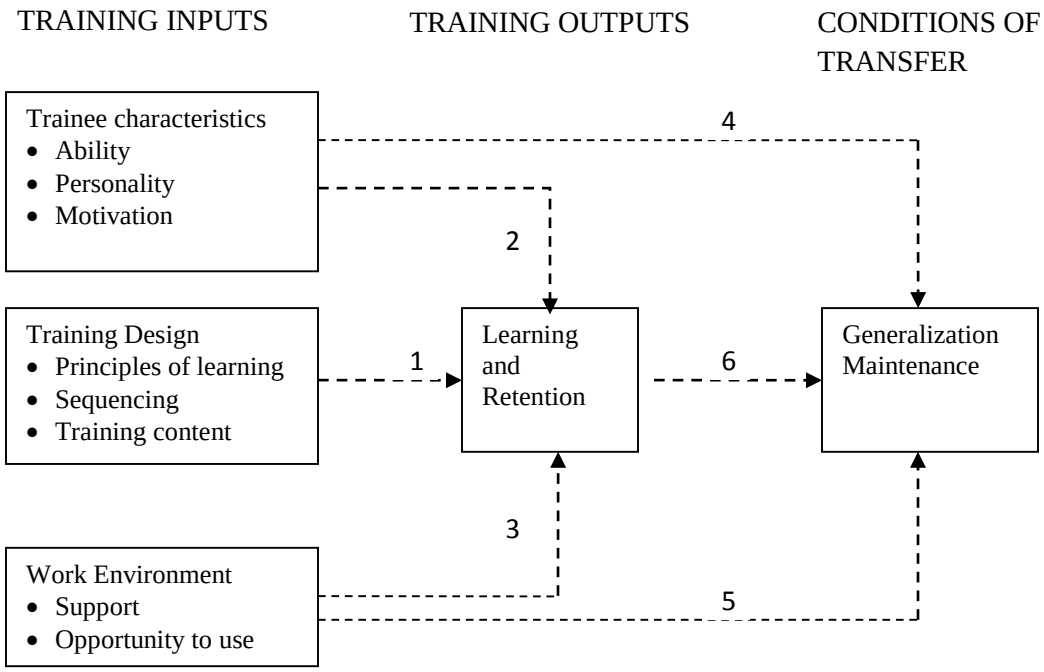


Figure 2.1: A Model of the Transfer Process

From "Transfer of training: A review and directions for future research" by Baldwin, T.T. and Ford, J.K., 1988, Personnel Psychology, 41(2), p. 65. Copyright 1988 by Personnel Psychology Inc. Reprinted with permission of the author.

The authors also went on to explain the three categories of training inputs, their framework and the variables. Definitions of the inputs and descriptions of the variables were developed by Rodriguez and Gregory (2005) in their qualitative study of students' employees training transfer and were summarized in Table 2.1 below.

Table 2.1: Definitions and descriptions of Baldwin and Ford (1988) training inputs and variables

Training Input	Definition	Variable Description

Trainee Characteristics	characteristics in the trainees that could influence the outcome of the training program	• Motivation: intrinsic or extrinsic factors motivating behaviour that could influence the training event or program.
		  ○ Extrinsic:
		  - Money: economic reward as a motivator for work or for attending a training event.
		  - Recognition: social recognition, positive or negative reinforcement as a motivator.
		  ○ Intrinsic:
		  - Experience: previous experience in the foodservice industry that could influence the outcome of the training program.
		  - Joy work: joy for the work performed as a motivator.
		  - Relationship: social relationships at the workplace as a motivator for work
		• Personality: personality traits or characteristics that could influence the outcome of the training event.
		  ○ Customer oriented: orientation toward customer satisfaction.
		  ○ Relationship oriented: focus on relationships with co-workers.
		  ○ Skills: pre-existent set of skills or abilities that could influence the outcome of the training event.
		  ○ Work ethic: behaviours and/or traits valued in the work setting.
		• Expectations:
		  ○ Confidence: expectation of a sense of confidence and ease with the work performed, as an outcome of a training event or program.
		  ○ Knowledge: expectation of formal knowledge, as opposed to experience, as an outcome of a training event or program.
		  ○ New skill: expectation of a new skill, as opposed to formal knowledge, as an outcome of a training event or program.

Training Design	elements related to the design of a training event or program that could influence its outcome.	• Content: topics, issues covered in the training event or program. • Interference: factors not related to the design of the training event or program that could influence its outcome; it can take the form of a noise during communication of training contents. • Principles of learning: elements of a training event or program that could influence its outcome based on the methodology used to execute the training event or program. • Relevance: pertinence and proximity of the contents and other formal aspects of the training that may influence the likelihood of generalizing the training to the workplace. • Sequence: elements of a training event or program related to the sequence of presentation of contents.

Table 2.1: Definitions and descriptions of Baldwin and Ford (1988) training inputs and variables (cont'd)

Work Environment	characteristics of the work environment that could facilitate or not the transfer of knowledge from training or the workplace.	• Admin: formal administrative support found at the workplace that could facilitate the transfer of knowledge from training to the workplace. • Management support: emotional support from the management found at the workplace that could facilitate the transfer of knowledge from training to the workplace. • Opportunity to use: actual opportunities found in the work environment that could facilitate the transfer of knowledge from training to the workplace. • Relation: work relationships found at the workplace that could facilitate the transfer of knowledge from training to the workplace. • Support: social support found at the workplace that could facilitate the transfer of knowledge from training to the workplace.

Note. From "Qualitative study of transfer of training of student employees in a service industry" by Rodriguez, C.M. and Gregory, S., 2005, Journal of Hospitality and Tourism Research. 29(1), p. 42-66. Copyright 2005 by the International Council on Hotel, Restaurant and Institutional Education.

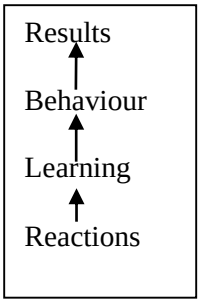
The work of Baldwin and Ford (1988) was excellent not only in providing a critique of transfer research over the said period but also giving directions for future research. Although it contained extensive information about the development of training inputs, explanations about the outputs, links and conditions of transfer were scant. It suffered from the lack of reference to job relevance, lack of theoretical framework to explain trainee characteristics, unclear specification of transfer, and lack of valid criterion measures. Besides these, other limitations were noted from studies outside of the transfer process model review. The model's learning and retention was projected as a uni-dimensional construct without accounting for different learning outcomes. This simple principle failed to add theoretical comprehensiveness to the model's capacity for evaluating training outcomes, a weakness akin to the limitation mentioned in the previous chapter which was the failure of current transfer models to adopt a systematic framework for evaluating training effectiveness. The concept of generalization and maintenance to represent conditions of transfer was not thoroughly defined and this adds to the ambiguity of criterion measures. The gradual development of training transfer models also revealed the lack of integration of social psychological theories, an approach which cannot be neglected as training involves human behaviour. For these reasons, Baldwin and Ford's (1988) original transfer process model which was developed based on a non-humanistic approach has to be revisited.

Training Evaluation and Training Effectiveness

Although training evaluation and training effectiveness had been used interchangeably, they are in fact two separate constructs. Training effectiveness is the study of variables likely to influence training outcomes i.e. a theoretical approach, while training evaluation is the methodological approach for measuring the outcomes (Alvarez, Salas and Garofano, 2004).

Baldwin and Ford (1988) is characteristic of a training effectiveness model while in the field of training evaluation, Kirkpatrick's (1967) four level evaluation model has been the most influential and prevalent. With its simple basic taxonomy, application of the model was easy and it legitimized the conceptualization of the training evaluation process. Its framework called for evaluation to proceed along four steps. These steps or levels were in fact categories of measures of the effectiveness of training outcomes. Each category was termed a "step" and the definitions of each step were:

Step 1: Reactions – trainees "liking of" and feelings for" a training programme.
Step 2: Learning – "principles, facts and techniques understood and absorbed" by the trainees.
Step 3: Behaviour – using learned principles and techniques on the job.
Step 4: Results – the ends, goals, or "results desired".



Each level was distinctive in what they were measuring. Level 1 in the model measured trainees' initial reaction which helped determine whether the training was favourable and provided quantitative information for improving future training. Level 2 measured the knowledge acquired, skills improved or attitudes changed as a result of training. Level 3 is used to assess change in workplace behaviours stemming from the knowledge gained in training while level 4 attempted to connect the impact of training with organizational results. In the early days, when the concept of transfer was still relatively unknown, organizations were only looking at Level 1 evaluation. Gradually the focus shifted to Levels 3 and 4 which assessed whether skills have been transferred from the training session to the job situation and whether investment on training has yielded positive impacts. These latter levels of training evaluation were important to signal 'training transfer' which is the successful application of knowledge and skills gained in training to their jobs.

Kraiger, Ford and Salas (1993) in their monograph on new methods of training evaluation noted, "the absence of a conceptual basis for evaluating learning was characteristic of prior models" (p. 311). Both Kirkpatrick's and Baldwin and Ford's models had these symptoms, which were the lack of clarity regarding the representation of learning outcomes and the measurement of these outcomes. Drawing on this disparity, Kraiger, Ford and Salas (1993) pursued an integrated theoretical research to derive a conceptually based classification scheme of learning outcomes for training evaluation. Based on Bloom's (1956) and Gagne's (1984) taxonomies of learning outcomes which were intellectual skill, cognitive strategy, verbal information, motor skill and attitude, they advocated a construct oriented approach and proposed three categories of learning outcomes: cognitive, skill-based and affective. These learning outcomes and associated evaluation measures are illustrated in Figure 2.2 and described in Table 2.2 below.

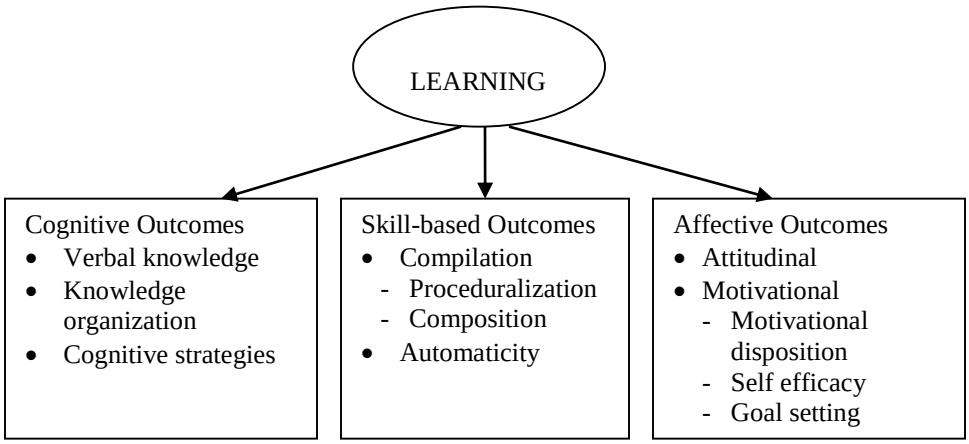


Figure 2.2: A preliminary classification scheme of learning outcomes

From "Application of cognitive, skill-based and affective theories of learning outcomes to new methods of training evaluation" by Kraiger, K., Ford, J.K. and Salas, E., 1993, Journal of Applied Psychology. 78(2), p. 312. Copyright 1993 by the American Psychological Association. Inc. Reprinted with permission of the author.

Table 2.2: A classification scheme for learning outcomes for training evaluation

Category	Learning Constructs	Focus of measurement	Potential training evaluation methods
		Cognitive Outcomes	
Verbal knowledge	Declarative knowledge	Amount of knowledge Accuracy of recall	Recognition and recall tests
		Speed, accessibility of knowledge	Power tests Speed tests
Knowledge organization	Mental models	Similarity to ideal Interrelationships of elements Hierarchical ordering	Free sorts Structural assessment
Cognitive strategies	Self insight Metacognitive skills	Self-awareness Self-regulation	Probed protocol analysis Self report Readiness for testing
		Skill-based Outcomes	
Compilation	Composition Proceduralization	Speed of performance Fluidity of performance Error rates Chunking Generalization Discrimination Strengthening	Targeted behavioural observation Hands-on testing Structural situational interviews
Automaticity	Automatic processing Tuning	Attentional requirements Available cognitive resources	Secondary task performance Interference problems Embedded measurement
		Affective Outcomes	
Attitudinal	Targeted object (e.g. safety awareness) Attitude strength	Attitude direction Attitude strength Accessibility Centrality Conviction	Self-report measures
Motivation	Motivational disposition	Mastery versus performance orientations Appropriateness of orientation	Self-report measures
	Self efficacy	Perceived performance capability	Self-report measures
	Goal setting	Level of goals Complexity of goal structures Goal commitment	Self-report measures Free recall measures Free sorts

Note. From "Application of cognitive, skill-based and affective theories of learning outcomes to new methods of training evaluation" by Kraiger, K., Ford, J.K. and Salas, E., 1993, Journal of Applied Psychology. 78(2), p. 323. Copyright 1993 by the American Psychological Association. Inc. Reprinted with permission of the author.

As quoted earlier, training is "a planned process to modify attitude, knowledge or skill behaviour through learning experience to achieve effective performance in an activity or range of activities". Ultimately this meant that the litmus test is transfer, whether learned outcomes are used in the workplace. According to Olsen (1998), transfer of training occurs when the knowledge learned is actually used on the job for which it was intended while Ford and Weissbein (1997) defined it as the application, generalizability and maintenance of newly acquired knowledge and skills. Although constant references have been made about knowledge and skills, not many studies have investigated the impact of training on attitude, a cognitive element that may influence behaviour and practice. In their review of training transfer, Baldwin and Ford (1988) acknowledged that research had neglected this area and that there is a need for relevant criterion measures of generalization and maintenance especially for understanding behaviour. Realizing this anomaly, several transfer studies have turned to social psychological theories to explain the human psychological process.

Redefining the Transfer Process Model

"One of the first steps in building a theory is to ask what constructs should be included" stated Whetten (1989). He also added that researchers had to balance the need to be comprehensive and yet be parsimonious. Based on these guiding words, this study will attempt to re-conceptualize the transfer process model which was developed by Baldwin and Ford (1988) by pulling together the models, theories and concepts that have been discussed above. Without doubt, Baldwin and Ford (1988) transfer process model remained one of the most conceptually influential model for the advancement of training transfer research. Its theoretical framework of individual factors, training design and work environment on transfer of training had been well established and frequently cited whether in its entirety or expanded and modified by other

researchers to advance knowledge about training effectiveness. This pattern can be observed by scrolling over the models under the section "development of transfer models". Factors constantly identified to affect training effectiveness hovered around three distinct categories of the individual or trainee, the training programme and the work environment or organizational climate. But at the same time, the authors concluded in their review that there were weaknesses in their model. These were:

1. The lack of an integrative perspective to develop and test a framework that incorporates interactions amongst training inputs.
2. The lack of job relevance in training content therefore resulting in a lack of specification of desired knowledge, skills or behaviours (baseline).
3. The lack of relevant criterion measures to determine generalization and maintenance of skills and behaviours.

To address the first point, the emergence of sophisticated multivariate data analysis tools such as structural equation modelling has enabled multiple measurements on individuals or objects under investigation to be analyzed simultaneously. It can bring several different factors, in this case the individual, design and environment which had previously been examined independently, to be examined together to understand their multiple relationships within the defined structural context. For the final two points, a number of studies will be drawn together to justify the establishment of baseline and criterion measures for determining transfer outputs. As presented earlier, Kirkpatrick's four level evaluation model was praised for its simplicity and legitimacy. However, findings of small correlations between levels of training criteria (Alliger and Janak, 1989) challenged the validity of Kirkpatrick's (1967) hierarchy of training criteria. The authors suggested that the hierarchical relationship is superfluous in that 'reactions' may not cause 'learning' to occur and there was nothing to support the direct linear relationship between reaction and learning. In the same respect, learning is not necessary a pre-requisite to behaviour, a fact

supported by Clement (1982) and Noe and Schmitt (1986). Alliger and Janak (1989) further suggested that an independent category of attitudinal reactions be created separately from learning or behaviour. This is in sync with Kraiger et al (1993) argument that learning should be reflected as changes in cognitive, affective or skill capabilities, details of their proposition had been described above under the 'classification scheme of learning outcomes for training evaluation'. A meta-analysis of training literature by Alliger et al (1997) recommended the re-articulation of 'reactions' and 'learning' training criteria. The term 'reactions' under Kirkpatrick's taxonomy was ill defined and lack clarity, therefore, the authors proposed that reactions could be reflected as an affective, utilitarian or combined reaction. To fine tune this aspect of outcome representation, social psychological theories will be tabled for discussion. Transfer of training defined as the degree to which trainees effectively apply the knowledge, skills and attitudes gained in a training context to the job (Newstrom, 1984; Wexley and Latham, 1981) deals with human behaviour. Therefore theories of reasoned action and planned behaviour which helps explain the human psychological process can enhance the design of training evaluation. Although these two theories focused on intention as the predictor of behaviour, attitude is proposed to have a more direct relationship with behaviour. Empirical studies (Eagly and Chaiken, 1993; Fazio, 1995; Kraus, 1995) have proved that attitude can affect various sorts of behaviour. Ensuing research have shown that strong attitudes are more likely to affect behaviour (Holland, Verplanken and Van Knippenberg, 2002) while weak attitudes are more likely to be shaped by behaviour. In a meta-analysis by Glasman and Albarracin (2006) about attitude formation, they found that attitudes influence behaviour when they have direct experience with the attitude object, gets constantly promoted and received behaviour-relevant information, easy to retrieve from memory and stable over time. On the basis of empirically supported theories of reasoned action and planned behaviour, attitude can reasonably be applied to predict behaviour (provided that the TACT principle is adhered) and this principle will be used to guide the model reconstruction.

By putting together all the above bodies of theories and concepts, the proposed model for this study intends to redefine Baldwin and Ford's (1988) transfer process model by replacing training outputs of learning and retention with constructs of knowledge and attitude while conditions of transfer will be represented by the behaviour construct. The proposed changes to the model are shown in the shaded boxes in Figure 2.3 below.

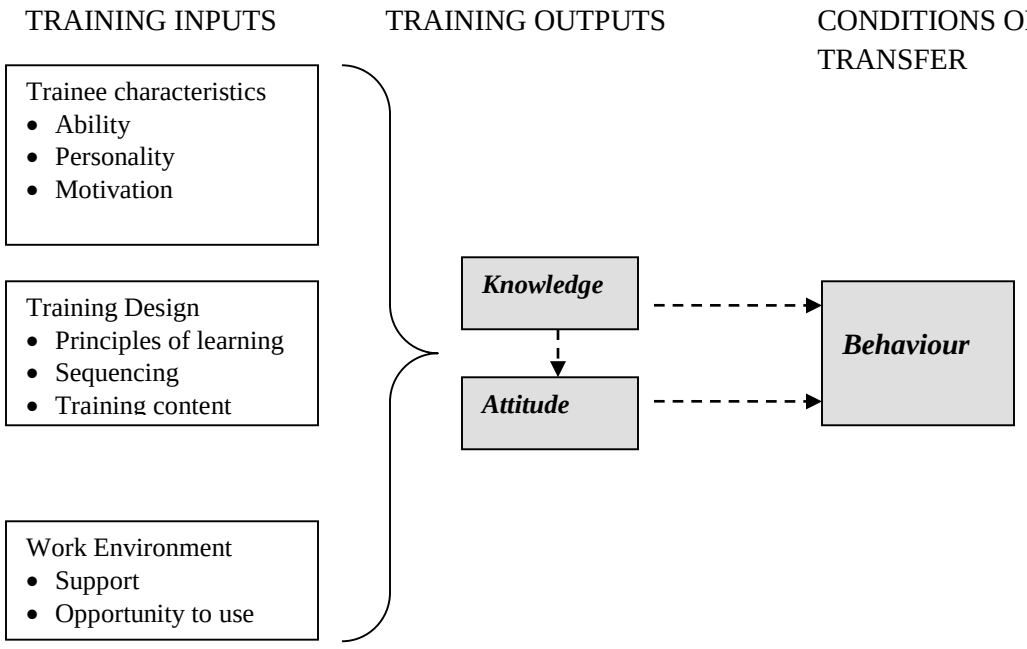


Figure 2.3: Revised version of the Transfer Process Model with replaced training outputs and conditions of transfer.

This study aims to understand the effects of training design, trainee's characteristics and work environment on the knowledge, attitude and behaviour of foodservice employees. Baldwin and Ford's (1988) transfer process model with its organized taxonomy of constructs had been used as a springboard for this study. Although the model was conceptualized over 20 years ago, the framework of training inputs and their corresponding set of variables are still valid today. Apart from a few newly identified items, most of the variables listed in Baldwin and Ford's model are still known to influence transfer. These variables will be analysed for their suitability to

explain the constructs of the proposed model and their posited relationships in the context of food hygiene training transfer. Key questions to be addressed in this study include:

- How do factors such as trainee characteristics, training design and work environment independently affect food handlers' food hygiene knowledge, attitude and behaviour?
- How do factors such as trainee characteristics, training design and work environment simultaneously affect food handlers' food hygiene knowledge, attitude and behaviour?
- How does knowledge affect food handlers' food hygiene behaviour?
- How does knowledge affect food handlers' attitude towards food hygiene behaviour?
- How does attitude affect food handlers' food hygiene behaviour?
- How do knowledge and attitude affect food handlers' food hygiene behaviour?

Training Outputs and Conditions of Transfer

Research on the interaction between knowledge, attitude and behaviour which are the proposed outputs of the redefined transfer process model, has been controversial. Mathias, Sizto, Hazlewood and Cocksedge (1995) reported that food handlers who had completed education courses produced better inspection scores. This was also supported by Stevenson (1987) who stated that group who had completed food safety program showed improved performance. In a pre and post training test, employees of University foodservice establishments demonstrated improved safety and sanitation knowledge scores at the end of training than before training (Tracey and Cardenas, 1996). On the contrary, studies by Powell et al (1997) and Kirby and Gardiner (1997) suggested that there is no relationship between knowledge level of staff and hygiene standard of the premises. According to Tebbutt (1984) and Worsfold (1993), training has been shown to improve food safety knowledge and hygiene awareness but improved knowledge does not always translate into improved food handling behaviour (Kassa, 2001; Mathias, Riben, Campbell & Wiens, 1994; Taylor, 1994). From a survey of food handlers' practices in Wales, 61%

of trainees admittedly reported that they did not comply with food safety practices even though they possessed food safety and sanitation knowledge (Clayton et al, 2002). These studies defied earlier premonitions that the relationships between training, knowledge and food safety practices are linear. These concerns were also shared by Griffith and Clayton (2005) who reported that improved knowledge does not automatically lead to behavioral changes. Some employees have difficulties correcting previously gained bad hygiene practices and may bring this attitude to their new place of work. They suggested that staff attitudes can limit or prevent improvements in practices. The idea of perceived risk (Coleman and Griffith, 1998; Mortlock, Peters and Griffith, 1999) has shown that food handlers' perception of low risk food contamination from their foodservice establishment could negate their need to be vigilant in food safety practices. Perceptions indicate the motivation behind an individual's actions and will form an attitude towards behaviour. In Egan et al.'s (2007) review of forty-six food safety and food hygiene training studies, 29 of these focused on the assessment of knowledge to determine training effectiveness while very few evaluated attitudes, behaviour and work practices. The authors also pointed out that food hygiene training has some effect on knowledge, attitude and behaviour; however, how these factors affected each other were inconclusive due to variations in research design and outcomes measured. To be of value methods of evaluation should incorporate aspects of knowledge, attitude and behaviour.

As a result of the above inconclusive evidences, the relationship between knowledge, attitude and behaviour should be further explored and efforts in simultaneous multivariate analysis may be useful to explain the impact of training on knowledge, attitude and behaviour.

Knowledge, Attitude and Behaviour

Knowledge, attitude and behavior are some of the outcomes of learning and training. Knowledge consist of ordered and structured information which had been integrated within a person's cognitive structures. In this case, food safety knowledge was the accumulation of various sources of food safety information to which a person was exposed; this may be in the form of workplace orientation, information provided by environmental health officers (EHOs) during on-site inspections, printed food safety resources, mass media, and advertisers or through formal food safety training courses. A meta-analysis of food safety training on food handlers' hand hygiene knowledge and attitudes by Soon, Baines and Seaman (2012) confirmed that food safety training can lead to increased knowledge and improved hand hygiene attitudes although the effect on attitude was comparatively lower. Attitude was "a mental and neutral state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related" (Allport, 1935, p. 784). Eagly and Chaiken (1993, p.1) described it as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor". Basically attitudes were overall evaluations of a particular entity, which can be inferred from and have an influence on beliefs, affect and overt behavior. Studies by Thompson, de Burger and Kadri (2005) reaffirmed that training can improve food safety knowledge and hygienic awareness and may result in improved food safety practices. But Kassa (2001) and Redmond and Griffith (2003) indicated otherwise and reported that improved knowledge does not always translate into improved food handling behaviour. Behaviour were overt actions or activities that were observable and measurable directly (Myers, 2001).

Human behavior is complex, and multiple factors, not just knowledge, affect whether humans engage in any particular behavior. In fact the nature, structure and measurement of behavior has remained up to this present day a central source of interest in the attitude construct

to help understand and predict the behavior of individuals. For such studies, the theories of reasoned action and planned behavior (Ajzen, 1991; Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975) provided useful conceptual framework and workable methodology. The Theory of Reasoned Action states that behavior is a function of a person's intention to perform a behavior and intention is a function of two factors; attitude towards the behavior (beliefs about the outcomes of the behavior and the value of these outcomes) and subjective norm (beliefs about what other people think the person should do, as well as the person's motivation to comply with the opinion of others). In the Theory of Planned Behavior, the concept of perceived behavioral control was added to the Theory of Reasoned Action. This concept was similar to the concept of self-efficacy which was the person's perception of his or her ability to perform the behavior. The characteristics of the latter two theories were displayed together in Figure 2.4 below.

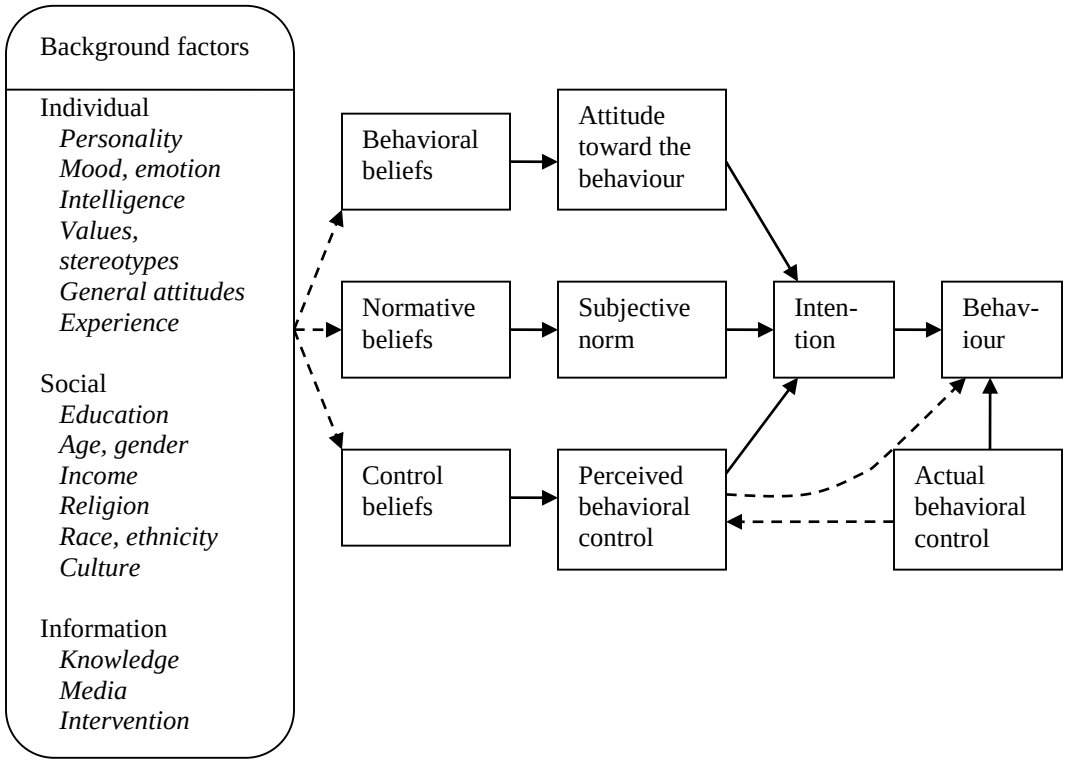


Figure 2.4: The theories of reasoned action and planned behaviour.

From "The influence of attitudes on behaviour" by Ajzen. I. and Fishbein, M., 2005, in *The Handbook of Attitudes*, edited by D. Albararracin, B.T. Johnson & M.P. Zanna. Lawrence Erlbaum Associates, Mahwah, New Jersey.

However, to apply the attitude construct to predict single behaviors the principle of compatibility has to be observed. A single behavior can be viewed as involving an action directed at a target, performed in a given context, at a certain point in time (Ajzen and Fishbein, 1977, 1980; Fishben and Ajzen, 1975). When specifying the measures of attitude and behavior, it was important that they involved exactly the same target (T), action (A), context (C) and time elements (T). Empirical research has shown that specific behaviors can be predicted quite well from compatible measures of attitude toward the behaviors in question. Thus studies which presumed such relationship has to ensure that appropriate measurement criterion were employed.

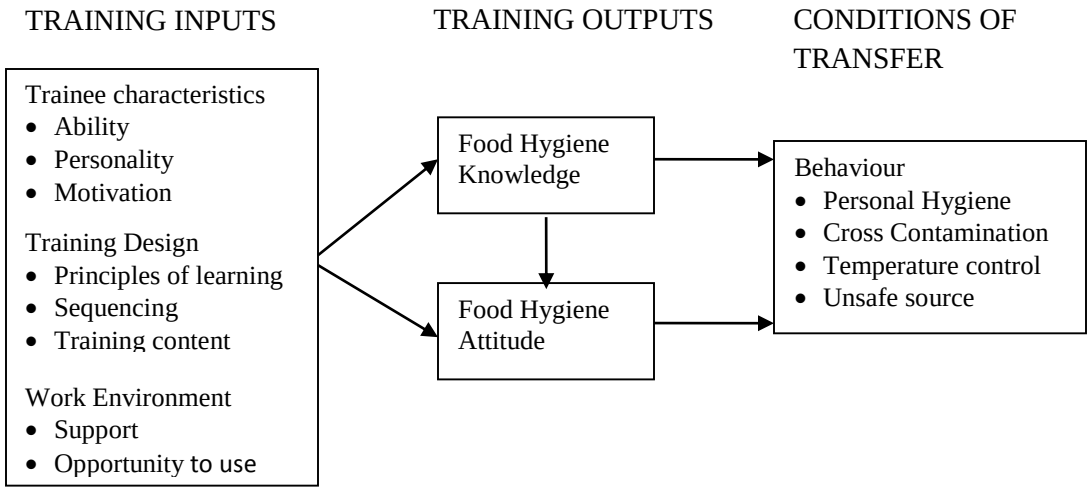


Figure 2.5: Proposed Theoretical Framework

The research hypotheses tested in this study were:

H1. Training input will have a positive effect on knowledge.

H2. Knowledge will have a positive effect on behavior.

H3. Training input through the mediating effect of knowledge will have a positive effect on behavior.

H4. Training input will have a positive effect on attitude.

H5. Attitude will have a positive effect on behavior.

H6. Training input through the mediating effect of attitude will have a positive effect on behavior.

H7. Knowledge will have a positive effect on attitude.

H8. Training input through the mediating effects of knowledge and attitude will have a positive effect on behavior.

CHAPTER III

METHODOLOGY

The object of this study was to develop a theoretically integrated model to examine the effects of training inputs on food hygiene knowledge and attitude of foodservice employees and simultaneously explain the relationships between these factors in prompting safe food handling behavior in the workplace. Specifically, this model was designed to test and analyse the relationships between training input, knowledge, attitude and behavior, in particular (1) the mediating effect of knowledge between training input and behavior, (2) the mediating effect of attitude between training input and behavior, and finally (3) the mediating effects of knowledge on attitude and attitude on behavior in the path between training input and behavior. This chapter described the methodological approaches of the research framework, instrument design, survey implementation and proposed analysis with explanations and justifications for the chosen methods.

Research Design

Causal and descriptive research design was used in this study. Causal research served to understand the structural relationships between training input and perceived knowledge and attitude of foodservice employees with respect to carrying out food hygiene behavior in the

workplace. A model was developed to examine the cause-effect relationships between the independent variable of training input and the dependent variables of knowledge, attitude and behavior. The direct effect of training input on knowledge, the direct effect of knowledge on behavior, the direct effect of training input on attitude and the direct effect of attitude on behavior as well the mediating effects of knowledge and attitude were the subjects for simultaneous interpretation. This model was tested on foodservice employees drawn from independently operated Chinese and non-Chinese (Western) foodservice operations in Hong Kong.

Descriptive research which served 'to portray an accurate profile of persons, events or situations' (Robson, 1993:4) was used to understand foodservice employees' demographics, food hygiene training profile, impact of training input, perceived knowledge, attitude and behavior from the two groups of foodservice operation. Data from the two groups of employees was compared and analyzed for their differences across the type of operation. A cross-sectional study examined foodservice employees' extent of food hygiene knowledge, attitude and behavior at a given point in time. Likewise results from the groups of employees was compared to determine if the level of their knowledge, attitude and safe food handling behavior differed across the type of operation and whether these differences were influenced by their work, demographic background and/or training experiences.

Instrument development

The research instrument was developed based on organized literature in the field of training transfer, food hygiene and safety, education and training, published theses and dissertations. Also, it was guided by past research on current food hygiene and safety issues and remedial measures to these issues. The self-administered questionnaire aimed to capture information on foodservice employees' background, food hygiene training, work experiences and specific information about

their food hygiene knowledge, attitude and behavior. The questionnaire consisted of seven sections with each one seeking to explain the theory and hypotheses specified in the model.

Section A. The questionnaire began by asking foodservice employees' personal demographics and employment characteristics.

Section B. The next section captured foodservice employees' past and present food hygiene training experiences, types of training and the last time when training was undertaken. The questions sought to trigger foodservice employees' recollection of their training experiences and prepared them to answer questions in sections C to F. Responses were measured using an interval scale.

Section C. This section attempted to understand how personality, training material and work environment, collectively known as training inputs influenced employees' food hygiene beliefs and practices. Statements representing personal characteristics, training and work environment dimensions were extracted from past training transfer studies (Vosburg, W.J., 2000; Castonguay, S., 2005; Sitzmann, T., Brown, K.G., Casper, W.J. & Ely, K., 2008; Tracey & Tews, 2005) and summarized in Table 3.1. These statements were grouped and listed as individual factors, instructional factors and organizational factors.

Table 3.1: Summary of training transfer statements from various sources

INDIVIDUAL FACTORS	
My ability to use newly acquired skills was adequate (after training). I took the initiative to implement the new skills on the job I had the confidence to learn new skills in this training	Vosburg, W.J. (2000)
At the end of the training module, I felt confident and better able to perform my job. At the end of the training modules I attended, I was motivated to use the knowledge and skills learned. I have realized value from the training modules. I have the personal energy to implement the new knowledge and skills learned during the training. After attending the training modules, I felt confident and self assured about applying my abilities in my job. I was able to overcome obstacles that hindered the use of my knowledge and skills learned in training.	Castonguay, S. (2005)
Specific Self Efficacy for Transfer: I am confident that I can apply the material that I learned in the course to my job I believe that I can transfer what I have learned to my job I am certain that I can use the skills I learned in training to improve my job performance I am confident that I have learned the material presented in training I believe that I have improved my work-related skills during the training course	Sitzmann et al (2008)
INSTRUCTIONAL FACTORS	
The training content was relevant to my job. The training course content was job or organization specific The training resulted in added value to my organization My job required the use of the new knowledge and skills learned in the training.	Vosburg, W.J. (2000)
The knowledge and skills learned during training were applicable to my job. The knowledge and skills learned during training were useful to improve my job performance. The training activities and exercises used during the training modules were realistic and close enough to my job. The training content of the training module was relevant to the job I perform at the work site. The training methods used by the instructors during the training modules helped me to apply my new skills at work. During the delivery of the training module, I received feed-back and examples on how to apply what I have learned. During the training, I was given sufficient time and opportunities to practice the skills I need to apply at work. I have learned many useful knowledge elements and skills during the training modules.	Castonguay, S. (2005)
The information presented in this course is relevant to my job The training will help me perform my job This training will have a positive impact on my job performance I do not think I will use what I learned in this class* The training was relevant to my job	Sitzmann et al (2008)

Table 3.1: Summary of training transfer statements from selected sources (cont'd)

ORGANIZATIONAL FACTORS	
I had sufficient time to practice the newly acquired skills on the job Sufficient resources (equipment, time, software) were available after training I had the opportunity to use the new skills on the job My peers/co-workers supported me in using the new skills on the job The organizational culture supported the training My supervisor provided post-training support for skills learned in the course My peers/co-workers encouraged the use of new skills on the job	Vosburg, W.J. (2000)
The organization system and structures in my workplace allows me to apply what I have learned in training. My supervisor/manager clarified performance expectations before and after I attended the training modules. My supervisor conducted a pre-training meeting and linked the training objectives to our organizational objectives. My supervisor conducted a post training meeting where I was asked to propose an action plan for implementing the new knowledge and skills gained from training. I have received positive feedback (formal or informal) from people in my work environment when I applied the knowledge and skills learned in training. My supervisor/manager created opportunities for me to apply the new knowledge and skills gained from training. I have had time to apply what I learned from the training modules. My organization created an environment in which we were encouraged to use what we learned in training. The organization culture, structure, policies and procedures have supported me to apply what I learned in training.	Castonguay, S. (2005)
Managerial Support: Supervisors give recognition and credit to those who apply new knowledge and skills to their work. Supervisors match associates needs for personal and professional development with opportunities to attend training. Independent and innovative thinking are encouraged by supervisors. Top management expects high levels of performance at all times. Top management expects continuing technical excellence and competence. *Job Support*: Gaining new information about ways to perform work more effectively is important in this organization. Job assignments are designed to promote personal development. Learning new ways of performing work is valued in this organization. Work assignments include opportunities to learn new techniques and procedures for improving performance. There is a strong belief that continuous learning is important to successful job performance. *Organizational Support*: There is a performance appraisal system that ties financial rewards to use of newly acquired knowledge and skills. This organization offers excellent training programmes. Employees are provided with resources necessary to acquire and use new knowledge and skills. There are rewards and incentives for acquiring and using new knowledge and skills in one's job. This organization rewards employees for using newly acquired knowledge and skills on the job.	Tracey & Tews (2005)

Guided by the shortcomings identified in Chapter 1 and recommendations discussed in Chapter 2, statements in Table 3.1 were short-listed. Theoretical concepts that strongly identified to personal characteristics were ability (Robertson & Downs, 1979), motivation (Mathieu et al., 1992; Noe, 1986; Tannenbaum et al., 1991) and self-efficacy (Ford, Quinones, Sego & Sorra, 1992; Gist, Bavetta & Stevens, 1990; Tannenbaum, Mathieu, Salas, Cannon-Bowers, 1991), which resulted in statements compiled in Table 3.2. Statements representing training strongly favored the theory of identical elements (Baldwin & Ford, 1988; Goldstein, 1986) as trainees needed to see the relevance in content and work tasks to transfer skills to the work setting, and the importance of engaging in these tasks, the theory of principles of learning (Decker, 1982). Of the few theories that were relevant to work environment, management and organizational support (Ford et al., 1992; Huczynski & Lewis, 1980; Tracey, Tannenbaum & Kavanagh, 1995) were often cited in that workers felt encouraged to practice what they have learnt when resources and systems were put into place.

The shortlisted statements were reviewed for their adaptability to the foodservice context in Hong Kong so that words could be modified for all ranks of foodservice employees in both Chinese and non-Chinese foodservice operations to comprehend. In the survey, foodservice employees were required to indicate their opinions to a series of statements regarding the impact of personality, training and work environment on their food hygiene training experiences and practices. Their levels of agreement or disagreement to these statements were recorded on a 7-point Likert scale where the scale of 1 represented strongly disagree and 7 represented strongly agree. These training inputs (known as independent variables) were tested for their significance in promoting training transfer amongst the different groups of employees in particular their effects on knowledge and attitude (dependent variables).

Table 3.2: Proposed training input statements for Section C

PROPOSED STATEMENTS
Trainee Characteristics: - It is my responsibility to practice food hygiene at work. - I have the ability to practise food hygiene in the workplace. - I am confident in practising food hygiene in the workplace.
Training Design: - Food hygiene and safety training materials provided at the workplace were relevant to food hygiene. - The length of training during my recent work experience was sufficient for me to become competent in practising food hygiene. - The training session helped me understand the importance of practising food hygiene.
Work Environment: - The company provides resources for me to apply food hygiene and safety practices. - The company rewards employees for using new knowledge and skills on the job. - My peers/co-workers encouraged me to use food hygiene and safety skills I have learned in the training.

Section D. This section was designed to measure foodservice employees' knowledge about food hygiene practices. Depositories of food hygiene statements (see Table 3.3) were gathered from prior food hygiene education and training evaluation studies (Manning & Snider, 1993; Medeiros et al., 2004, Tang & Fong, 2004; Yarrow, 2006), food safety research projects (Byrd-Bredbenner et al., 2007), textbooks, and websites of food safety assessment/certification centers. Although the sources varied, their assessment design were very similar in outlook where content and questions included multiple choice or true/false format which required absolute answers to objectively measured proficiency in food hygiene knowledge. The majority of these assessments specified pass rates of 50% to 70% to fulfill the minimum criteria of competence in food hygiene knowledge and the questions usually covered all aspects of hygiene and safety management in foodservice operations.

Table 3.3: Summary of food hygiene knowledge statements from various sources

PERSONAL HYGIENE:	
1. Employees with communicable diseases should not handle food as long as they are sick. 2. A food handler should wash his or her hands.	Manning and Snider (1993)
1. Best way to wash hands before preparing food 2. If you have diarrhoea it is okay to prepare food for others if wash hands	Medeiros et al. (2004)
1. Smoking is permitted in a kitchen 2. You must wear a uniform when on duty 3. You cannot handle food if you have diarrhea. 4. You must know how to wash hands. 5. In general one should take 15-30 secs. to wash hands	Tang & Fong (2004)
1. The best way to clean your hands before preparing food is: 2. If you have diarrhoea, it's okay to prepare food for others in the family if you wash your hands first.	Yarrow(2006)
1. If you have a sore on the back of your hand, should you prepare food for other people?	Byrd-Bredbenner et al., 2007
CROSS CONTAMINATION:	
1. You should keep raw meat, poultry or fish separate from cooked food during preparation. 2. Dishes should be washed, rinsed and sanitized but kitchen equipment (such as slicers and grinders) only needs to be wiped off with a dampened sponge or cloth. 3. When handling cooked foods you should use any of these: (plastic disposable gloves, waxed paper, forks, tong, long handled spoons or scoops).	Manning and Snider (1993)
1. Can use same cutting board for raw chicken and raw vegetables if wiped off between uses 2. Wash hands with soap and warm running water after touching raw ground beef 3. Cloth used with raw meat can be safely used if rinsed in hot water	Medeiros et al. (2004)
1. Raw and cooked foods must be kept in separate containers. 2. It is incorrect to place tray containing frozen food on the ground to be defrosted. 3. You can use insect repellent to spray cockroach as when on duty in a kitchen.	Tang & Fong (2004)
1. After you have shaped ground beef patties with your hands, which of the following best describe what you should do next before continuing cooking. 2. Is using the same cutting board to cut up raw chicken and then vegetables for a salad safe as long as you wipe the board off with a clean cloth between different foods? 3. If you use a dishcloth to wipe up liquid from meat or chicken, can you safely continue to use the cloth for washing dishes if you rinse the dishcloth in hot water?	Yarrow(2006)
1. When should kitchen counters be washed, rinsed and sanitized?	Byrd-Bredbenner et al., 2007

Table 3.3: Summary of food hygiene knowledge statements from various sources (cont'd)

TEMPERATURE CONTROL:	
1. Hot foods should be kept above 140^0F (60^0C) and cold foods below 45^0F (7^0C). 2. You should prepare salads containing meat, poultry, eggs or fish with pre-cooled ingredients whenever possible. 3. Frozen foods should be received and stored at (0^0F).	Manning and Snider (1993)
1. All foods are considered safe when cooked to an internal temperature of: (74^0C) 2. To prevent food poisoning, how long should leftover foods be heated? 3. What is the least safe method for thawing frozen food? 4. What is the best method for cooling a large pot of hot soup?	Byrd-Bredbenner et al.(2007)
COOK FOODS ADEQUATELY:	
1. When hamburger has no pink colour, it is adequately cooked 2. Cooking eggs until yolk and white are firm will kill germs 3. Hamburger should be cooked until temperature is (71^0C)	Medeiros et al. (2004)
1. Hamburger patties should be cooked until the temperature in the middle is: 2. When you can't see any pink colour inside a cooked hamburger patty, you know all of the harmful germs have been killed and the hamburger is safe to eat. 3. Cooking eggs until both the yolk and white are firm will kill harmful germs.	Yarrow (2006)
COOLING/REHEATING:	
1. Cooked foods can be held at room temperature for several hours because the bacteria have been killed during cooking. 2. Maximum height of pans used to cool and store food in refrigerators should be not more than 4 inches.	Manning and Snider (1993)
1. Cooked food can be stored at room temperature.	Tang & Fong (2004)
1. Chilling or freezing eliminates harmful germs in food.	Byrd-Bredbenner et al.(2007)
KEEP FOODS AT SAFE TEMPERATURES:	
1. Cooked rice at room temperature > 4 hours is safe 2. Cooked meat at room temperature > 4 hours is safe 3. Whole apple at room temperature > 4 hours is safe 4. Baked potato at room temperature > 4 hours is safe	Medeiros et al. (2004)
1. If the following food items are let out at room temperature for more than 2 hrs, are they safe to eat or should they be thrown away: Cooked rice Cooked meat Whole apple Baked potato	Yarrow (2006)
AVOID FOODS FROM UNSAFE SOURCES:	
1. Pasteurization of milk and juice helps prevent illness 2. It is safe to use raw eggs in recipes that will not be cooked 3. Persons at high risk for illness should avoid soft cheeses 4. Persons at high risk for illness should avoid cold smoked fish 5. Persons at high risk for illness should avoid well done roast beef 6. Persons at high risk for illness should avoid cold deli salads	Medeiros et al. (2004)
1. Pasteurization of milk and juices helps prevent foodborne illness. 2. It is safe to use raw eggs in recipes that will not be cooked.	Yarrow (2006)

Statements in Table 3.3 reflected knowledge of hygiene and safety from their source of contamination. These categories included personal hygiene, cross contamination, temperature control, cooking, storing and food source. In Hong Kong, the Centre for Food Safety identified bacterial contamination as the most common cause of food poisoning and the most likely contributors were:

- cross contamination of ready to eat food by raw food;
- cross contamination by food handlers;
- inappropriate storage of ready to eat food at temperature of 4-60^{0}C;
- prolonged storage of ready to eat food at room temperature; and
- inadequate cooking, especially in the case of seafood.

To maintain consistency in the measurement criterion for the constructs of knowledge, attitude and behavior, food hygiene practices were evaluated across the categories of personal hygiene, cross contamination, temperature control and unsafe source. Items for the latent construct of knowledge were made up of statements that tested employees' depth of food hygiene and safety knowledge in each category. After considering the merits and demerits of various assessments type questions, this section adopted the Likert scale format to enable the application of structural equation modelling in the statistical analysis. The degree of foodservice employees' knowledge was established from the level of their agreement to a group of food hygiene knowledge statements (see Table 3.4).

Table 3.4: Proposed food hygiene knowledge statements for Section D

Personal Hygiene (PH)
Washing hands before handling food will completely eliminate the risk of food contamination. There is no risk of food contamination from open cuts or sores on the hand. It is safe to allow a person with diarrhoea to handle food after washing hands.
Cross Contamination (CC)
Food contact surfaces alternately used to prepare raw and ready to eat foods without cleaning is harmless. The separate use of utensils to prepare raw and ready to eat foods will reduce the risk of food contamination. Raw and cooked foods must be handled separately to avoid cross contamination.
Temperature Control (TC)
Correct control of temperatures is more important for handling of raw foods than cooked foods. Frozen food left to thaw at room temperature is safe for cooking. Food can be refrozen after thawing. Reheating leftover foods until it is warm enough will make it safe to eat.
Unsafe Source (US)
It is safe to use fresh raw eggs in recipes that will not be cooked. Pasteurization of milk and juice helps prevent foodborne illness.

Sections E and F. These sections aimed to capture employees' attitudes about food hygiene practices and their self-reported safe food handling behaviors. As evidenced in the literature, there were significant research to develop instruments for measuring food safety knowledge, attitudes and behavior and to evaluate food hygiene training effectiveness. These studies involved consumers, young adults, University students' and professional food handlers' from domestic to commercial situations. Although a wide spectrum of resource was available, this study wanted to focus on information for developing the attitude and behavioral constructs of foodservice employees in commercial foodservice operations.

Section E - The Attitude Construct. The attitudes of interest were individual's positive or negative evaluations of performing prescribed food hygiene behaviors in their workplace. Dissertations and articles were reviewed for questionnaires and statements that reflected foodservice employees' attitudes and beliefs in food practices that were associated with contamination and food borne illnesses. Coleman, Griffith & Botterill (2000) evaluation of Welsh caterers' attitude towards safe food handling espoused all the features to develop this construct

except for areas of personal hygiene and cross contamination which were inadequate. Studies by Manning & Snider (1993) and Clayton & Griffith (2003) were used to improvise this absence. The inventory of attitude/belief items was presented in Table 3.5.

Table 3.5: Summary of attitudes/beliefs statements regarding food hygiene practices from various sources

Coleman, Griffith & Botterill (2000)
1. I intend to handle poultry with no greater care than other foods.
2. Prepared meat products and pies are rarely implicated in food poisoning. #
3. Cooked rice should be handled and stored with particular care.
4. I have no reservations about serving lightly cooked eggs.
5. Temperature controls are an effective method of reducing the number of cases of food poisoning. #
6. Cross-contamination is easy to avoid in catering operations.
7. Cooling cooked foods rapidly helps to prevent food poisoning.
8. Serving food rare or underdone is undesirable.
9. Preparation of food in advance is likely to contribute to food poisoning.
10. Correct control of temperatures is more important for raw foods than cooked foods.
11. Reheating of cooked or previously prepared foods is of minor importance in food safety.

proposed to delete due to contextual inappropriateness (2) and explicitness (5).

Manning & Snider (1993)
1. Properly washing hands at work on a regular basis will decrease the likelihood that people will get sick.
2. Cleaning and sanitizing all food contact surfaces helps to eliminate cross contamination.
3. It is fine for staff with diarrhea to prepare foods as long as they have washed their hands.

Clayton & Griffith (2003)
1. Cleaning all surfaces between preparation of raw and ready-to-eat foods is: (unimportant to extremely important)
2. Using different utensils or washing utensils in between use with raw and ready-to-eat foods is: (unimportant to extremely important)

Yarrow (2006)
1. I am not concerned if I thaw perishable food on the kitchen counter
2. Cooking and eating eggs that have firm yolks and whites is important to me for safety.
3. Drinking pasteurized apple juice or cider is important to me for safety.
4. After cutting raw meat or chicken, I like to wash the cutting board, knife and counter top with hot soapy water before continuing cooking.
5. I am not interested in using a meat thermometer.
6. I don't worry that I may get sick if I eat alfalfa and other raw sprouts.
7. I am worried that I may get sick if I eat hot dogs right out of the package.
8. Using cheese and yoghurt made only from pasteurized milk is important to me.
9. I am concerned that I may get sick if I eat raw oysters.
10. I don't worry about keeping the refrigerator at or below 40 degrees Fahrenheit.
11. I don't worry about washing my hands after playing with my pets.

Table 3.5: Summary of attitudes/beliefs statements regarding food hygiene practices from various sources (cont'd)

12. It is not important to cover a cut or sore on my hand before I prepare food.
13. Refrigerating food such as rice and beans overnight before serving them the following day is not a priority for me.
14. There is no need to store eggs in a refrigerator; room temperature is just fine.
15. I have little control over the food that I serve in my home.
16. There is really no way I can prevent someone who's eaten food I prepared from getting food poisoning.
17. There is little I can do to change many of my food preparation habits.
18. I often feel helpless if I or someone I know gets food poisoning from restaurant food.
19. Sometimes I feel that if I or someone I know gets sick from food I cooked, life just has it in for me.
20. Whether or not food is handled safely in my home in the future mostly depends on me.
21. When it comes to safe food preparation, I can do just about anything I really set my mind to.

Using the framework of consistent criterion measures, statements from Table 3.5 were extracted to construct Section E across the categories of personal hygiene, cross contamination, temperature control and unsafe source. In this section, foodservice employees were asked for their opinions regarding food hygiene practices that prevented food contamination and maintained food safety in the workplace. Foodservice employees were asked to express their attitudes towards the statements by indicating on a 7-point Likert scale whether they strongly disagreed, represented by a scale of 1, or strongly agreed, represented by a scale of 7.

Table 3.6: Proposed attitude statements for Section E

Personal hygiene:
- I believe that properly washing hands on a regular basis will reduce the risk of food contamination.
- It is not necessary to cover a cut or sore on my hand before I prepare food.
- I feel that practice of food hygiene is time consuming and a deterrent to work productivity.
- I believe the practice of food hygiene will not reduce the risk of food contamination.
- I think my personal hygiene habits do not pose any risk to food safety.

Table 3.6: Proposed attitude statements for Section E (cont'd)

Cross Contamination:
- Cleaning and sanitizing all food contact surfaces helps to eliminate cross-contamination. - I think it is important to use different utensils in between use with raw and ready to eat foods. - I think raw and cooked foods must be handled separately. - I feel the separate handling of raw and ready to eat foods adds inconvenience to the food preparation process.
Temperature Control:
- I am not concerned if I thaw frozen food at room temperature. - Reheating of cooked or previously prepared foods is of minor importance in food safety.
Unsafe Source:
- I believe lightly cooked eggs will not contribute to food poisoning. - I continue to use food that has passed its expiry date provided it still looks safe. - Serving food rare or underdone is undesirable.

Section F - The Behavior Construct. Behavior denoted something that people do or refrain from doing, although not always consciously or voluntarily (Gouchman, 1988). In the context of this study, this would be foodservice employees' act of preventing or minimizing food poisoning and food borne diseases in the workplace. Activities performed while at work that were representative of preventing food borne disease or promoting food hygiene were identified and operationalized into measures of effective food hygiene behavior. For instance, representative behaviors can include "use separate cutting boards for raw and ready to eat food"; "wash hands thoroughly before commencing work"; "store cooked food not ready for consumption into refrigerator or hot cabinet", etc. Respondents were asked to score their frequency in performing the respective behaviors. Although self reported measures had drawbacks and may not accurately reflect true behavior, under the assumption of stable determinants, a measure of past behavior can be used to test the sufficiency of any new model designed to predict future behavior (Azjen, 1991).

References used to develop the food hygiene knowledge questions in section D and the attitudinal construct were revisited again (see Table 3.7). Statements which emphasized specific

areas of personal hygiene, cross contamination, temperature control and unsafe source were reviewed to build the behavioural construct. Foodservice employees were asked to indicate their performance of these behaviours by rating them on a 7-point Likert scale, where the scale of 1 represented not at all likely to a scale of 7 which represented very likely or a scale of 0 if it was not applicable.

Table 3.7: Summary of behavioral statements from various sources

PERSONAL HYGIENE:	
1. I wash and dry my hands after handling raw foods. 2. I wash and dry my hands before handling ready to eat foods.	Clayton & Griffith (2003)
1. Wash hands after visiting restroom. 2. Wash hands before preparing food. 3. Wash hands before preparing raw meat/poultry. 4. Wash hands when changing tasks. 5. Wash hands periodically. 6. Wash ands when putting on gloves/changing gloves. 7. Wash hands after handling money. 8. Wash hands after sneezing/coughing. 9. Wash hands after eating/drinking. 10. Wash hands after taking a break. 11. Wash hands after touching face, hair or clothes. 12. Use sanitizer.	Green & Selman (2005)
1. Before preparing or handling food I wash my hands with soap and warm running water. 2. I wash my hands with soap and warm running water after working with raw meat, poultry or seafood and before I continue cooking. 3. If I have a cut or sore on my hand, I cover it before preparing food.	Yarrow (2006)
1. I wash my hands with soap and hot water for 20 secs. 2. I wash my hands before work. 3. I wash my hands when food preparation tasks are interrupted or changed	Pilling et al. (2008)
FOOD OF UNSAFE SOURCE:	
1. Determining food doneness: • Use thermometer. • Use length of time cooking. • Use appearance of food. • Use feel of food. • Use thermometer with certain foods. • Use thermometer when inexperienced/working with new food.	Green & Selman (2005)
1. I discard shellfish such as mussels or clams if the shellfish has not opened during cooking.	Yarrow (2006)

Table 3.7: Summary of behavioral statements from various sources (cont'd)

CROSS CONTAMINATION:	
1. I clean surfaces between preparation of raw and ready to eat foods. 2. I use different utensils or wash utensils in between use with raw and ready to eat foods.	Clayton & Griffith(2003)
1. Clean and sanitize work surfaces, utensils and equipment. 2. Sanitize (but not clean and rinse) work surface, utensils and equipment. 3. Use gloves or utensils to prevent bare hand contact. 4. Keep raw meat/poultry separate from other foods with separate storage areas. 5. Keep raw meat/poultry separate from other foods during preparation with separate work areas/surfaces. 6. Wash hands after preparing raw meat/poultry. 7. Use stainless steel equipment. 8. Work only with raw meat/poultry until task is complete. 9. Flip cutting boards after using one side.	Green & Selman (2005)
1. I wash the plate used to hold raw meat, poultry or seafood with hot, soapy water before returning cooked food to the plate or I use a clean plate. 2. I clean countertops with hot soapy water after preparing food.	Yarrow (2006)
1. I separate raw food from ready to eat foods. 2. I clean and sanitize all food contact surfaces between each use. 3. I clean and sanitize all food contact surfaces when switching from one food preparation task to another.	Pilling et al. (2008)
TEMPERATURE CONTROL:	
1. I put frozen meat and poultry on the counter in the morning to thaw, ready to cook in the evening. 2. I leave cooked foods such as rice or beans on the stovetop overnight to use the next day.	Yarrow (2006)
1. I reheat food to a temperature of 165^0F (74^0C). 2. I ensure food stored on the hot line is at least 135^0F (58^0C). 3. I ensure food stored on the cold line is 41^0F (5^0C) or less.	Pilling et al. (2008)
1. Holding foods • Use steam tables. • Use walk-in coolers. • Use sandwich/preparation tables. • Use salad bars. • Check temperatures of held foods. • Record temperatures in temperature logs. • Set shelf life for held food. • Throw away foods held at improper time/temperature. • Stir held foods. • Cover held foods. 2. Cooling foods • Place cooling food in walk-in coolers. • Place cooling food in shallow or small pans. • Use ice baths. • Use cooling wands/paddles. • Use blast chiller. • Check temperatures of cooling food. • Record temperatures in temperature logs. 3. Reheating • Reheat food prior to placing in holding. • Do not reheat prior to placing in holding. • Discard foods rather than reheat. • Reheat only once. • Check the temperatures of reheated foods. • Record temperatures in temperature logs.	Green & Selman (2005)

Table 3.8: Proposed behavioral statements for Section F

PERSONAL HYGIENE:
- I wash my hands with soap and water before starting to prepare food. - I wash my hands when food preparation tasks are interrupted or changed. - If I have a cut or sore on my hand, I cover it before preparing food.
CROSS CONTAMINATION:
- I clean and sanitize all food contact surfaces after each task. - I clean and sanitize all food contact surfaces between preparation of raw and ready-to-eat foods. - I use a separate clean utensils for each food item. - I separate raw food from ready to eat foods.
TEMPERATURE CONTROL:
- I leave frozen foods to thaw at room temperature. - I check the temperature of food at the completion of reheating. - I put leftover food not used for cooking in the refrigerator.
UNSAFE SOURCE:
- I check whether food is cooked by feeling it and looking at its appearance. - When I am in doubt about the safety of a previously cooked food I throw it out rather than serve it.

Section G – Facilitators and Barriers. The final section explored employees' perception of various resources which either aided or limited their capacity to apply food hygiene practices. Employees' were asked to rate the level of significance, where the scale of 1 represented not at all significant to a scale of 3 which represented extremely significant.

Survey Questionnaire

The target population was foodservice employees working in Hong Kong, therefore the English version questionnaire was translated to Chinese. Translation was arranged through the Center for Translation in the Faculty of Arts of a local university. Using the back translation method for verification, a professional translator was appointed to translate the English version to Chinese which was then translated back to English by a local academic and specialist in foodservice. Pilot test interviews were conducted with academics and industry professionals to refine the content and replace poorly worded or delete insignificant items. This process ensured questions were coherent to local foodservice employees in Hong Kong and culturally correct.

Pilot Test

A pilot test of the questionnaire was conducted with 41 employees of a foodservice organization to examine its validity and reliability. Reliability helped to determine how well individual items of the scale were measuring the same construct and whether they were highly inter-correlated. The degree of internal consistency was assessed by a reliability coefficient known as Cronbach's alpha, and the generally agreed lower limit was 0.70. Reliability analysis was used to trim items with low values from each construct resulting in the following Cronbach alpha scores for each Sections; C ($\alpha = 0.594$), D ($\alpha = 0.606$), E ($\alpha = 0.756$) and F ($\alpha = 0.673$). Results from the pilot study also helped to improve the flow, structure and format of questions in Sections B and G.

Sampling

Target Population

The target population for this study were foodservice employees of independently operated Chinese and non-Chinese foodservice operations in Hong Kong. The object was to understand their perspectives of factors that were influential in their training experiences and to examine their food hygiene knowledge, attitude and behavior under varying conditions of employment. Since the foodservice industry in Hong Kong is made up of many groups and types of operations, it was important that the sample was capable of representing the population of interest. To accomplish this, proportionate stratified random sampling was used where foodservice establishments in the frame were first stratified by types and then by employment size.

Sample Size and Approach

Based on Hong Kong's Standard Industrial Classification index, which maintained a comprehensive register of establishments, foodservice operations were classified under the Accommodation and Foodservice activities sector (HKSAR Census & Statistics Dept., HSIC V2.0, 2009). For this study, the Accommodation activities sector was excluded since hotel or guesthouse operated foodservice operations were not the target population. The Foodservice activities sector was further classified into Chinese restaurants, Non-Chinese restaurants and Fast food shops. According to the Quarterly Report of Employment and Vacancies Statistics, there were a total of 8,507 Food and Beverage service establishments which engaged a total of 177,358 employees (HKSAR Census & Statistics Dept., Quarterly Report of Employment and Vacancies Statistics 2012). From the report, a breakdown of the number of establishments and the number of persons engaged under each category was used to establish the sampling frame (see Table 3.9). Since Fast food shops were not part of the target population, its numbers were not included in the estimation.

Table 3.9: Proportion of establishments and persons engaged in Chinese and Non-Chinese foodservice operations

Industry	Category	No. of establishments	No. of persons engaged	Proportion
Foodservice	Chinese	4,781	106,658	78%
	Non-Chinese	2,127	29,438	22%
TOTAL		6,908	136,096	100%

Source: Hong Kong Census & Statistics Department, Quarterly Report of Employment and Vacancies Statistics (December 2012).

To determine the sample size, two factors were considered. The sample size had to be a replicate for each stratum meaning the number of foodservice employees to be surveyed needed to be drawn proportionately from the respective number of Chinese and non-Chinese foodservice establishments. In addition, structural equation modeling

required larger sample size. The rule of thumb was to have at least 5-10 cases for each variable (Bentler & Chou, 1987). Since there were 6 constructs to be measured and each construct contained on average 3-4 variables, a sample size of at least 180-240 was required. Estimation of the sample size also needed to take into account the low response rate that was usually associated with social science surveys. Prior research had indicated that the usable rate was normally 30%. Based on the minimum sample size and 30% response rate, the total number of questionnaires to be distributed was approximately 600 (180 ÷ 30%) and this figure had to be divided proportionately among the target population as follows:

Industry	Type of operation	No. of establishments	No. of employees	Proportion	No. of questionnaires
Foodservice	Chinese	4,781	106,658	78%	468
	Non-Chinese	2,127	29,438	22%	132
TOTAL		6,908	136,096	100%	600

To collect the data, a number of foodservice unions and foodservice operations were contacted. Members of the Association for Hong Kong Catering Services Management and Hong Kong Federation of Restaurants and Related Trades are predominantly owners-operators of chain Chinese foodservice operations. Since the logistics for generating random samples of foodservice employees from these operations involved access into personnel data and records, it was decided that random sampling would discourage participation. Therefore, based on the researcher's occupational network these chain operations were conveniently selected and all foodservice employees were approached to take part in the censored survey. At the initial contact, owner-managers of these chain operations were briefed about the purpose and procedure of the survey. A letter or email was followed with details of the survey and to confirm establishment's consent to participate. The researcher conducted the distribution and collection of questionnaires. At

appointed dates and times, the questionnaires were distributed at the workplaces during the employees' break or in between shifts and collected after completion. Likewise, the same convenient approach was used to contact foodservice workers unions. The researcher visited the unions' premises at agreed dates and times when workshops and seminars were conducted. Before the commencement of the workshops or seminars, foodservice employees who were members of the unions were approached and briefed about the purpose and procedure of the survey. The questionnaires were distributed after seeking their consent and collected after completion.

Data Analysis

Descriptive Statistics

The frequencies, means, and standard deviations were calculated for all appropriate variables of the Chinese and Non-Chinese foodservice operations. The demographic, employment characteristics, training profile of the foodservice employees were determined using frequency distribution. Independent sample T-test was used to test if there are differences in the knowledge, attitude and behavior between the groups of foodservice employees from Chinese and Non-Chinese foodservice operations. ANOVA was performed to assess the relationship between knowledge, attitude and behavior scores with different demographic variables (age, gender, education, years of industry experience, type of training and employment characteristics) amongst the groups of employees of the respective foodservice operations.

Structural Equation Modelling (SEM)

Multivariate techniques such as multiple regression, path analysis and factor analysis are powerful for testing single relationships between independent and dependent variables but these techniques cannot take into account the interaction effects amongst the posited variables. In this study, a series of dependent and independent relationships needed to be examined at the same time. Initially the relationships between the independent variable of training input and dependent variables of knowledge and attitude were examined. In the subsequent analysis, knowledge and attitude became the independent variables and their relationships with behavior were examined. Therefore, SEM was used as it could estimate a series of interrelated dependence relationships simultaneously. The method was actually a combination of factor analysis and multiple regression in one procedure. When compared with other multivariate techniques, SEM had potential for theory testing and development as well as validation of constructs (Anderson, 1987; Anderson and Gerbing, 1988). However, structural equation models needed to be justified from theoretical reasoning. The relationships between latent constructs and their measures had to be accurately specified and all paths linking latent variables must be theoretically justified. The stages in SEM were:

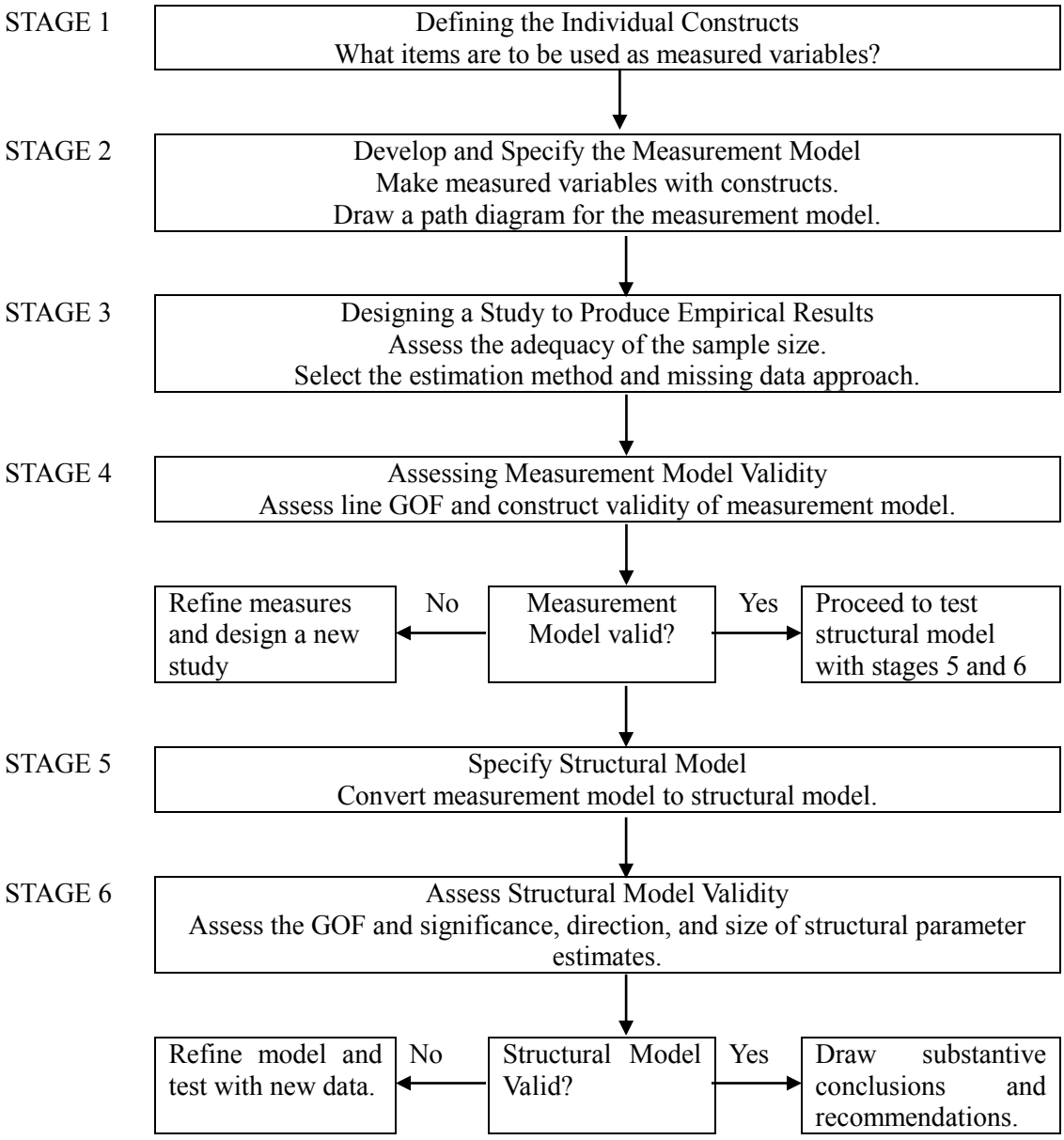


Figure 3.1: Six Stage Process for Structural Equation Modeling

Note. From "Multivariate data analysis" by Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E and Tatham, R.L., 2006, 6th. ed., p. 759. Copyright 2006 by Pearson Education Inc.

Stage 1. The constructs for the measurement model comprised of training input, knowledge, attitude and behavior. The first construct was and identified based on the long established theories of learning and training transfer while the latter three were identified based on the theories of social psychology and training evaluation. The constructs of knowledge and

attitude had both exogenous and endogenous properties while behavior was endogenous. The scales used to measure the items defining the constructs were borrowed from previous research thus to ensure construct validity, these scales were analyzed for content validity using exploratory and confirmatory factor analysis prior to model specification.

Stage 2. To satisfy statistical identification it was recommended that at least 3-4 scale items (indicators) represented a single construct (Hair et al. 2006). In this model all constructs were uni-dimensional and 15 items were specified across 4 latent constructs. This model contained reflective indicative factors as the latent constructs were thought to cause the measured variables.

Stage 3. All preliminary analyses to identify problems in the data were performed which included but not limited to:

1. Linearity of all relationships
2. Homoscedasticity
3. Multivariate normality
4. No kurtosis and no skewness
5. No extreme cases such as outliers
6. Data measured on interval or ratio scale
7. Sample size 100-400 (or a minimum ratio of five times more cases than the number of independent variables
8. Discriminant validity of measures
9. Random sampling (except for longitudinal studies)
10. Independence of error (not correlated to each other and no latent factors)

Covariance data matrix input was used as it provided greater information content than correlation matrix. Data collected from the pilot study was used as the initial sample to test the measurement

model. CFA was used to test the specification of indicators associated with each construct. AMOS was used to run the estimation process. During the process, CFA models were continuously examined for underlying problems of identification and data quality before correctly specifying the model.

Stage 4. This stage was to establish the measurement model's validity. The most fundamental measure used in SEM to quantify the differences between the observed and estimated covariance matrices is the Chi-Square Goodness of Fit (χ^2GOF) test but there were alternative goodness of fit measures. The object was to examine all aspects of construct validity through various empirical measures. Other fit indices to assess the model's goodness of fit included (Hair et al. 2006, p. 758):

- The χ^2 value and the associated *df*.
- One absolute fit index (GFI, RMSEA or SRMR)
- Once incremental fit index (CFI or TLI)
- One goodness-of-fit index (GFI, CFI, TLI, etc.)
- One badness-of-fit index (RMSEA, SRMR, etc.)

A guide from Hair et al. (2006, p. 753) on using the above fit indices was presented in Table 3.10.

Table 3.10: Characteristics of different fit indices demonstrating goodness-of-fit across different model situations

		N < 250			N > 250		
Stat.	No. of vars. (m)	m ≤ 12	12<m<30	m ≥30	m <12	12<m<30	m ≥30
χ^2		Insignificant p-values expected	Significant p-values can result even with good fit	Significant p-values can be expected.	Insignificant p-values can result with good fit.	Significant p-values can be expected.	Significant p-values can be expected.
CFI or TLI		.97 or better	.95 or better	Above .92	.95 or better	Above .92	Above .90
RNI		May not diagnose misspecification as well.	.95 or better	Above .92	.95 or better but do not use with N>1000	Above .92 but do not use with N>1000	Above .90 but do not use with N>1000
SRMR		Could be biased upward, use other indices.			Could be biased upward; use other indices.	.08 or less (with CFI above .92)	.08 or less (with CFI above .92)
RMSEA		Values < .08 with CFI = .97 or higher.	Values < .08 with CFI of .95 or higher.	Values < .08 with CFI above .92.	Values < .07 with CFI of .97 or higher.	Values < .07 with CFI of .92 or higher.	Values < .07 with CFI of .90 or higher.

Note. m = number of observed variables; N applies to number of observations per group when applying CFA to multiple groups at the same time.

Stage 5. Upon completion of stage 4, the relationships between constructs were specified based on the proposed theoretical model. In this study, the training input factor was believed to be positively related to knowledge and attitude independently. After that, the relationship was postulated to take on three paths. In one path, knowledge was believed to be positively related to behavior and in the other, attitude was assumed to be positively related to behavior. The third path was the indirect effect of knowledge on attitude influencing attitude's direct relationship with behavior. With the addition of the specified measurement structure and the correlational relationships accounted amongst exogenous constructs, the specified structural model was illustrated in Figure 3.2. Having specified the relationships, the model was ready for estimation.

Stage 6. The validity of the structural model and its corresponding hypothesized theoretical relationships were tested at this stage. Basically the process follows the general guidelines that were identified in stage 4 and the structural model fit must also be assessed.

Exploratory Factor Analysis

Principal component analysis (PCA) with varimax rotation will be used in the exploratory factor analysis of the 4 constructs. This is to reduce the dimensionality of the data set and to identify new meaningful underlying variables which may reflect the various constructs being measured in this study. The Bartlett test of sphericity and the Kaiser-Meyer-Olin measure of sampling adequacy (MSA) was used to determine the appropriateness of using factor analysis and Cronbach's alpha coefficient to determine the construct's internal consistency reliability.

Confirmatory Factor Analysis (CFA)

Following PCA, CFA will be performed to confirm the factor structures that make up the constructs of training input, knowledge, attitude and behaviour. The fit of the structured model will be checked by examining the χ^2 statistics. Other measures to ascertain fit will also be deployed and these include the goodness of fit index (GFI), adjusted goodness of fit index (AGFI), normed fit index (NFI), comparative fit index (CFI), standardized root mean square (SRMR), root mean square error of approximation (RMSEA), and normed T2 (T2/df).

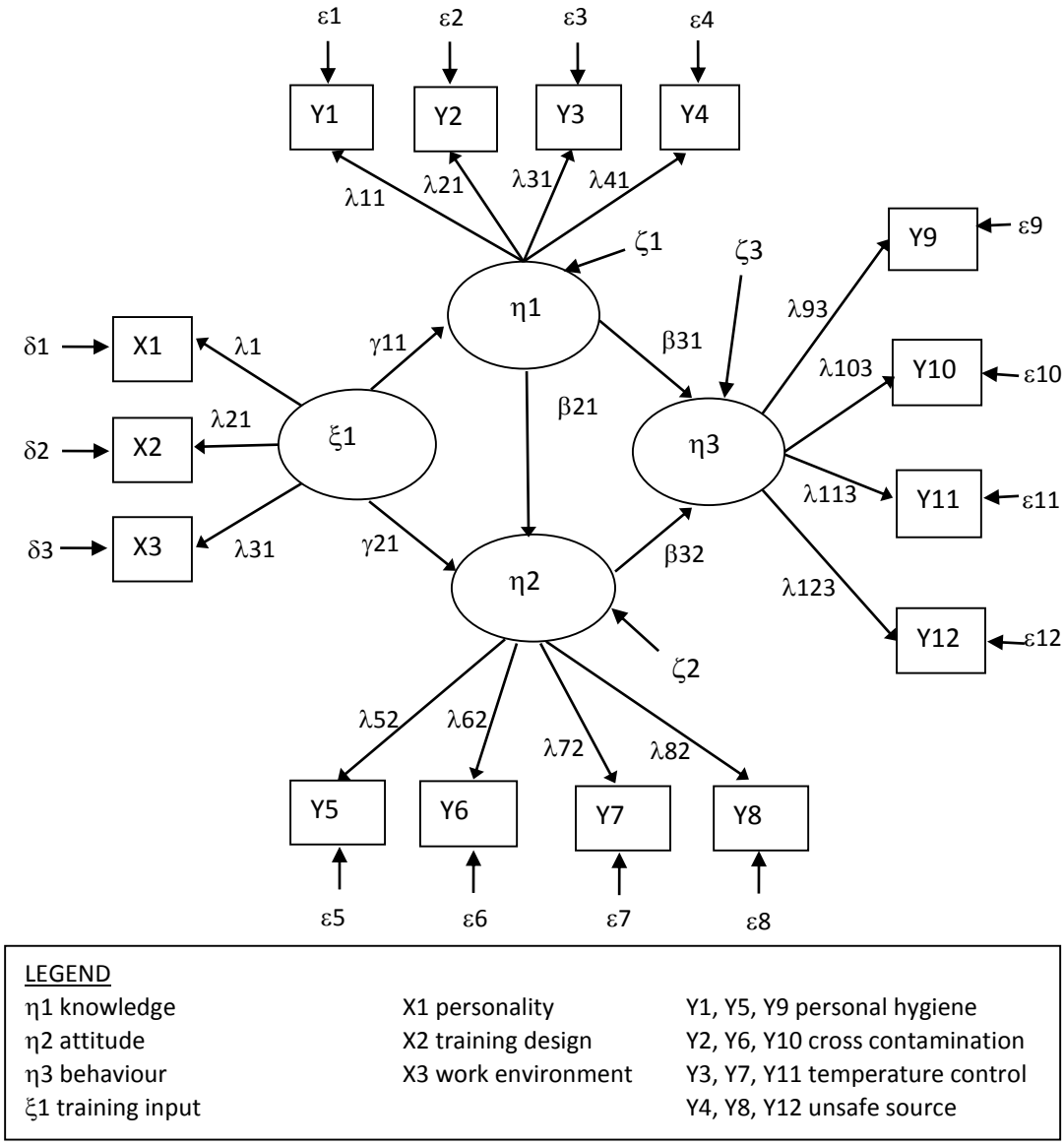


Figure 3.2: Path diagram showing hypothesized structural relationships and measurement specification

The measurement model contains 4 latent constructs with 15 measured indicator variables. The hypothesized relationship is between exogenous variable of training input, measured by indicators of trainee personality, training design and work environment, and the endogenous variables of knowledge, attitude and behavior, all represented by indicators of personal hygiene, cross contamination, temperature control and unsafe source. All measures are reflective where the direction of causality is from latent construct to measured items.

Limitations

The model is developed based on hypothesized inter-related dependency relationships between constructs and also assumes parameters have causal relationship. Results of SEM analysis do not reveal whether causal inferences are true between constructs. Therefore the structural model only shows whether causal assumptions embedded in a model fit the data (Bollen, 1989). With a heavy reliance on the model's theoretical specification, results will not pull out other possible relationships or explanations other than the one specified in the theoretical construct. The selection of independently operated Chinese foodservice operations was based on convenience rather than random which is not consistent with the methodological procedure of SEM. However, according to Muthen & Joreskog (1983), selectivity problems have long been recognized and as long as the process by which the observed units have been selected into the sample is systematic and consistent with the research study, the non-randomization is not a major issue.

This survey is confined to two types of foodservice operations in Hong Kong therefore results of this study may not generalize to other types of food establishments (organizational background, structure, culture) elsewhere. Methodologically, there is a time lapse between conducting the survey and training experience therefore foodservice employees' recall may not be accurately reflected. Furthermore, the survey is unable to capture a specific training program to evaluate which may lead to correlational issue and finally self-reported measures will contain a certain degree of bias.

CHAPTER IV

FINDINGS

This chapter presented findings on foodservice employees' demographics, their work experiences, training profiles, perceived motivators and barriers to food hygiene and safety and relationships between knowledge, attitude and behavior in the practice of food hygiene and safety. The data was first examined to get an overview of foodservice employees' personal information, work and food hygiene training experiences. It was then followed by exploratory factor analysis to determine the specification and identification of the measurement model. The next section looked at confirmatory factor analysis to assess and estimate the measurement model's validity. It then moved into structural model specification and data was plugged in to explain the structural relationships of the food hygiene transfer model. Direct, indirect and mediating effects of the model's constructs were analyzed and discussed. The final part reviewed differences in the two groups of foodservice employees' perception of training inputs, knowledge, attitude and behavior in the performance of food hygiene and safety in the workplace.

Foodservice Employees' Demographic Profile

From a total of 818 distributed questionnaires, 391 cases were returned, a response rate of 47.8%. Of these, 219 were Chinese foodservice employees (56%) and 172 (44%) were Western foodservice employees. The proportion of Chinese to Western foodservice employees were not able to meet the planned method of proportionate sampling since the response rate of Chinese foodservice employees were very low as compared to the Western counterparts. To try and increase the Chinese foodservice employees' response rate, extra questionnaires were distributed to additional foodservice operations and trade associations, however the timeline for data collection could not be extended any further for the numbers to reach the target ratio of 78% Chinese foodservice operations to 22% Western foodservice operations. On the other hand, response from Western foodservice operations were very positive and the number of questionnaires returned was well above the target of 132. Therefore final analyses of the data were carried out using a ratio of 56% Chinese foodservice operations to 44% Western foodservice operations.

Of the four levels of the industry's profession, there was almost an equal number of employees at operative and craft level (50.6%) and supervisory and managerial level (49.4%) who responded to the survey. However when broken into the types of operations, the number of Chinese foodservice employees at supervisory and managerial level (37.1%) was higher than Western foodservice employees (13.6%). At the operative and craft level, the number of Western foodservice employees (30.4%) was higher than Chinese foodservice employees (18.9%).

Table 4.1: Job levels of foodservice employees

	Frequency			**Percent**		
Job Title	**Chinese**	**Western**	**Total**	**Chinese**	**Western**	**Cumulative**
Manager level	32	12	44	8.2	3.1	11.3
Supervisor level	113	41	154	28.9	10.5	50.7
Craft level	62	108	170	15.9	27.6	94.2
Operative level	12	11	23	3.1	2.8	100.1
Total	219	172	391	56.1	44.0	

Majority of the respondents were male (90.3%) with a very small number of female (9.7%) employees. Most of them were in full-time employment (94.1%) with only a few (5%) working part-time. The ages of the respondents were fairly evenly distributed across the range of 18 to 50 years and above. In terms of education, the majority (74.9%) completed Secondary 3 – 7, not many foodservice employees were educated beyond secondary school level. The length of employment in the present company showed that employees were fairly stable in their job for the first five years of employment (15.9 to 17.1%). The figures dropped slightly in 5-9 years range (9 to 11.5%) but once employees have worked for 9 years or more, they tend to remain loyal with the company as evidenced in the high rate (30.7%). More than half of the respondents (55.5%) had worked in the foodservice industry for 10 years or more. There were not many respondents who had 3 years or less of foodservice industry experience (15.3%). This showed that the group of respondents in this study had extensive foodservice industry experience of 3 years or more (84.7%). In the question on the length of food hygiene and safety practice, there was one missing data. Out of the 390 respondents, 226 (57.9%) indicated that they had practiced food hygiene and safety for 5 years or more, only 10% practiced for less than a year. This indicated that the respondents were familiar in food hygiene and safety practices.

Table 4.2: Demographic profile of foodservice employees

Characteristics	**Frequency**	**Percentage %**	**Cumulative**
Gender			
Male	353	90.3	90.3
Female	38	9.7	100.0
Total			
Employment Type			
Full-time	368	94.1	94.1
Part-time	23	5.0	100.0
Total	391	100.0	

Table 4.2: Demographic profile of foodservice employees (cont'd)

Age			
18 yrs	3	8	8
18-25 yrs	58	14.8	15.6
26-30 yrs	43	11.0	26.6
31-35 yrs	61	15.6	42.2
36-40 yrs	70	17.9	60.1
41-49 yrs	82	21.0	81.1
50 yrs and above	74	18.9	100.0
Total	391	100.0	
Education Level			
University or above	3	0.8	0.8
Assoc Deg or Equi	2	0.5	1.3
Prof Dip/High Dip/Dip or Equi	21	5.4	6.6
Cert/Adv Cert or Equi	9	2.3	9.0
Sec 5-7	129	33.0	41.9
Sec 3-4	164	41.9	83.9
Others	63	16.1	100.0
Total	391	100.0	
Length Current Employment			
< 1 yr	67	17.1	17.1
1 yr to < 3 yrs	62	15.9	33.0
3 yrs to < 5 yrs	62	15.9	48.8
5 yrs to < 7 yrs	35	9.0	57.8
7 yrs to < 9 yrs	45	11.5	69.3
9 yrs and above	120	30.7	100.0
Total			
Length Industry Experience			
No prior experience	5	1.3	1.3
< 1 yr	17	4.3	5.6
1 yr to < 3 yrs	38	9.7	15.3
3 yrs to < 6 yrs	53	13.6	28.9
6 yrs to < 10 yrs	61	15.6	44.5
10 yrs or above	217	55.5	100.0
Total	391		
Length of Food Hygiene and Safety Practice			
Less than 1 year	39	10.0	10.0
Between 1-3 years	65	16.6	26.7
Between 3-5 years	60	15.4	42.1
Over 5 years	226	57.9	100.0
Total	390		

Food Hygiene and Safety Training Profile of Foodservice Employees

Table 4.3 showed that 258 respondents (66%) had received certified food hygiene and safety training, and the remaining 133 (34%) were without certified training. Of those who had certified training, 127 (49.2%) held Food Hygiene Manager certificates while 131 (50.8%) held Food Hygiene Supervisor certificates. A fairly significant number of respondents' (43.4%) certified training was arranged by their current employer, while the remaining was either organized by the previous employer (28.3%) or by themselves (28.3%). When asked to recall the last time they obtained these certificates, 152 (58.9%) responded that it was between 3 to over 5 years ago, while 106 (41%) received theirs 3 or less than 3 years ago. From the group of respondents without certified training, it was found that 70 respondents (17.9%) had not received any form of training, while 62 respondents (15.9%) had experienced some form of informal training and one respondent (0.2%) failed to provide details. The most common form of informal training cited were work experiences from the foodservice industry (44.4%) and company's orientation (22.2%). This group was also asked to indicate the last time they encountered non-certified training and 44 respondents (69.8%) stated 3 years or less. This meant that majority of the group's experiences of informal training were fairly recent.

Table 4.3: Food hygiene and safety training profile

Characteristics	**Frequency**	**Percentage**	**Cumulative**
Certified Training			
FEHD Food Hygiene Manager	127	49.2	49.2
FEHD Food Hygiene Supervisor	131	50.8	100.0
Total	258	100.0	
Training Organized by			
Current employer	112	43.4	43.4
Previous employer	73	28.3	71.7
Own	73	28.3	100.0
Total	258	100.0	

Table 4.3: Food hygiene and safety training profile (cont'd)

When Certificate Obtained			
Less than 1 year ago	51	19.8	19.8
Between 1-3 years ago	55	21.3	41.1
Between 3-5 years ago	52	20.2	61.2
Over 5 years ago	100	38.8	100.0
Total	258	100.0	
Non-Certified Training	62		
No Training	70		
Missing	1		
Total	133		
Type Non-Cert Training			
Company's orientation	14		
Briefing by manager/supervisor	7		
Food hygiene & safety workshops/seminars	9		
Food hygiene classes in University/College	3		
Work experiences from foodservice industry	28		
Others	1		
Missing	1		
Total	63		
Last Non-Cert Training			
Less than 1 year ago	27		
Between 1-3 years ago	17		
Between 3-5 years ago	6		
Over 5 years ago	12		
Missing	1		
Total	63		

Facilitators and Barriers of Food Hygiene and Safety Practice

A glimpse of foodservice employees' opinions regarding food hygiene and safety resources was captured in Tables 4.4 and 4.5. A score of 1 was the least important or significant while 3 was the most important or significant. The mean scores revealed that the three most important facilitators of food hygiene and safety were 'on the job work experience', followed by 'FEHD resources' and 'training courses'.

Table 4.4: Facilitators of food hygiene and safety

	FEHD resources	**Industry/Trade Associations**	**Internet**	**TV/Radio advertising**	**On the job work experience**	**Training courses**
Mean	2.59	2.32	2.25	2.21	2.62	2.55
Std Deviation	0.51	0.52	0.54	0.59	0.49	0.51

In terms of barriers, 'insufficient staff' was identified as the highest barrier followed by time constraints. Both 'inadequate training' and 'physical facility constraints' shared third place in hindering the practice of food hygiene and safety.

Table 4.5: Barriers of food hygiene and safety

	Time constraints	**Inadequate training**	**Insufficient knowledge**	**Insufficient staff**	**Management are not concerned**	**Physical facility constraints**
Mean	2.29	2.25	2.20	2.43	2.23	2.25
Std Deviation	0.52	0.56	0.64	0.57	0.65	0.61

Specification and Identification of the Measurement Model

Specification of the measurement model involved identification of the latent constructs and assignment of measured indicator variables to latent constructs (Hair et al., 2010). Since the latent constructs to be included in the model was hypothesized a priori, and the scales were taken from prior research, it was necessary to identify indicator variables that should be removed from the measurement model to make it more parsimonious and determine which indicators should be grouped together.

Exploratory Factor Analysis

Exploratory factor analysis (EFA) was used to evaluate the adequacy of individual items as indicators for the four latent constructs of Training Input, Knowledge, Attitude and Behavior. The strengths of the regression paths from the factors to the observed variables (factor loadings) were explored based on recommendations by Costello & Osborne (2005), who suggested that

indicators with factor loadings and communalities greater than 0.4 can be satisfactorily retained while Kaiser's (1970) criterion of eigenvalues greater than 1.0 factors was adopted for deciding on the number of factors to interpret. Negatively worded statements were reversed scored prior to commencing EFA. Each factor was rotated separately as a single component and indicators were removed step by step based on factor loadings, communalities, KMO and Bartlett's test and Cronbach's alpha reliability analysis until the most relevant and appropriate number of indicators to factor fit was reached.

Results of the Training Input variable after EFA were T1 (factor loading = 0.87, communality = 0.75), T2 (factor loading = 0.89, communality = 0.79) and T3 (factor loading = 0.78, communality = 0.60). Since the three indicators had factor loadings greater than 0.7 and an overall Cronbach alpha of 0.781, all the items were retained. With Knowledge, K1 (factor loading = -0.014, communality = 0.000), K4 (factor loading = 0.093, communality = 0.009), reversed K5 (factor loading = 0.192, communality = 0.037), K7 (factor loading = 0.170, communality = 0.029), and K8 (factor loading = -0.029, communality = 0.001) were deleted after the first extraction and rotation. In the second extraction and rotation, the retention of reversed K2 (factor loading = 0.840, communality = 0.705), reversed K3 (factor loading = 0.864, communality = 0.747) and reversed K6 (factor loading = 0.654, communality = 0.428) led to a cumulative % of 62.67. Results of the second rotation was computed again to see if the total variance explained could be improved. When reversed K6 was dropped from the structure, the result showed reverse K2 (factor loading = 0.900, communality = 0.811) and reversed K3 (factor loading = 0.900, communality = 0.811) produced a final solution with cumulative % of 81.07 and Cronbach alpha of 0.76 as compared to 0.68. Based on this comparative analysis, Knowledge was represented by reversed K2 and K3. In the first extraction and rotation of Attitude, A1 (factor loading = - 0.139, communality = 0.019), A3 (factor loading = 0.354, communality = 0.125) and A4 (factor loading = 0.305, communality = 0.093), reversed A7 (factor loading = -0.252, communality = 0.063) and

A8 (factor loading = 0.152, communality = 0.023) were deleted. Results of the second and third rotation were compared to determine which had a better fit. The outcome was the retention of two indicators, namely reversed items A5 (factor loading = 0.830, communality = 0.672) and A6 (factor loading = 0.830, communality = 0.672) with the final solution of 67.18 cumulative % and Cronbach alpha of 0.511. Although the widely accepted social science cut-off value of Cronbach alpha should be 0.70 or higher, the standard of reliability between fields of psychology tend to vary; cognitive tests tend to be more reliable than tests of attitudes or personality. According to Costello and Osborne (2005), a factor with 5 or more items with strong loadings of at least 0.5 was considered a solid factor. Other studies such as Oyerinde (2008) prescribed that Cronbach's alpha values of 0.5 to 0.8 were regarded as satisfactory. Since attitude statements often generate inconsistent reaction and responses, the low reliability score for Attitude was considered as satisfactory. For the Behavior variable, B5 (factor loading = - 0.074, communality = 0.005), B6 (factor loading = 0.577, communality = 0.332) and B7 (factor loading = 0.204, communality = 0.042) were deleted after the first extraction and rotation. Further reduction in indicators failed to produce a better solution therefore the retained indicators were items B1, B2, B3, B4 and B8 which had cumulative % of 57.57 and Cronbach alpha of 0.792. Results from the exploratory factor analysis showing the latent factors and their respective observable variables were presented in Table 4.6.

Table 4.6. EFA results

Factor	Eigen value	% of Variance	Cumulative %	Cronbach's Alpha	Factor loading	Com-munality
Training Input	2.148	71.592	71.592	0.781		
T1. It is my responsibility to practice food hygiene at work.					0.866	0.750
T2. The relevance of food hygiene and safety training materials helped me understand and become engaged in food hygiene.					0.892	0.796
T3. The company provides resources for me to practice food hygiene and safety.					0.776	0.602
Knowledge	1.621	81.065	81.065	0.763		
RK2. There is no risk of food contamination from open cuts or sores on the hand.					0.900	0.811
RK3. Food contact surfaces used alternately without cleaning to prepare raw and ready to eat foods will not contaminate food.					0.900	0.811
Attitude	1.344	67.179	67.179	0.511		
RA5. Thawing frozen food at room temperature will not lead to cross contamination.					0.820	0.672
RA6. Reheating of cooked food or previously prepared foods is not a major concern in food safety.					0.820	0.672
Behavior	2.879	57.57	57.57	0.792		
B1. I wash my hands with soap and water before starting to prepare food					0.810	0.657
B2. If I have a cut or sore on my hand, I cover it before preparing food					0.783	0.612
B3. I clean and sanitize all food contact surfaces between preparation of raw and ready-to-eat foods					0.670	0.449
B4. I separate raw food from ready to eat foods					0.734	0.539
B8. When I am in doubt about the safety of a previously cooked food I throw it out rather than serve it.					0.788	0.622

To verify that the above EFA results were appropriate, the factors with reduced indicators were analyzed using Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of

sphericity. Table 4.7 below showed the KMO statistics for all factors were greater than or equal to 0.5 while Bartlett's tests were significant (values of Sig. were less than 0.05 for all factors), therefore the EFA was confirmed as adequate.

Table 4.7: KMO-MSA and Bartlett's test of sphericity (with items deleted)

	Training Input	**Knowledge**	**Attitude**	**Behavior**
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.671	0.500	0.500	0.764
Bartlett's Test of Sphericity Approx. Chi-Square	404.950	189.499	48.802	714.404
df	3	1	1	10
Sig	0.000	0.000	0.000	0.000

Estimation of the Measurement Model

Estimation of the measurement model was performed using the SEM software of SPSS Amos 21 based on the maximum likelihood estimation (MLE) technique.

Missing Data and Outliers

Given that SEM is not capable of running with missing values, and non-random missing data can create bias in the statistical results (Hair et al., 2010), it was necessary to screen the data set for missing values. Incomplete questionnaires with missing values were discarded at the outset during data entry process. During analysis, it was found that the sections for training input, knowledge and attitude contained 391 cases while behavior had 389 cases. These two cases had completely neglected to complete Section F, which asked for their frequency in practicing food hygiene at the workplace. Since they did not represent any high level data the missing values were replaced using the mean scores.

Outliers can bias the mean and affect the normal distribution of data (Field & Hole, 2003). Descriptive analysis was used to check the minimum and maximum scores which should

be 1 and 7 since the questionnaire used a seven point Likert-scale type measurement. No outliers were detected. The computation of the squared Mahalanobis distance was also employed to check each case for outliers. A review of the AMOS text output did not reveal any case with a Mahalanobis distance value that was distinctly different from other Mahalanobis distances (Bryne, 2010).

Normality Check

A requirement for SEM analysis is that data are of multivariate normal distribution. The three indicators of variable distribution evaluation recommended by Finney and DiStefano (2006) were univariate skewness, univariate kurtosis and multivariate kurtosis. Hair et. al., (2010) further added that variables achieving univariate normality can help attain multivariate normality and large sample size with a minimum number of 200 cases can diminish the detrimental effect of non-normality. Authors (Curran, West & Finch, 1977) of estimation methods studies used by SEM computer programs described variables with absolute values of SI > 3.0 as 'extremely' skewed and absolute values of KI from 8.0 to over 20.0 to mean 'extreme' kurtosis. Therefore, skewness of less than 3.0 and kurtosis statistics that was less than 8.0 were indicators of normal distribution. Results of AMOS normality test in Table 4.8 showed skewness of all variables in the measurement model to be less than 3.0 and kurtosis was less than 8.0, thus indicating the data were normally distributed.

Table 4.8: Assessment of Normality

Variable	Min	max	skew	c.r.	kurtosis	c.r.
B8	1.000	7.000	-1.125	-9.083	.418	1.689
B4	3.000	7.000	-1.439	-11.616	1.572	6.345
B3	1.000	7.000	-1.325	-10.696	1.691	6.825
B2	1.000	7.000	-1.752	-14.143	1.927	7.777
B1	2.000	7.000	-1.009	-8.145	1.217	4.912
Rev_A6	1.000	7.000	-.350	-2.823	-.914	-3.687
Rev_A5	1.000	7.000	-.676	-5.455	-.760	-3.069
Rev_K3	1.000	7.000	-2.105	-16.993	3.737	15.083
Rev_K2	1.000	7.000	-2.002	-16.161	2.798	11.295
T3	1.000	7.000	-1.436	-11.595	2.282	9.211
T2	1.000	7.000	-1.646	-13.287	3.850	15.541
T1	1.000	7.000	-1.912	-15.434	5.293	21.362
Multivariate					82.437	44.464

Nomological Validity and Face Validity

These validity tests may seem trivial but are important to screen out fundamental errors. Nomological validity is an examination of the correlations among the constructs and their consistency with the measurement theory. Face validity ensured scales from prior research when used together in a single measurement model do not overlap in content. The correlation matrix below summarized the interrelationships between sets of variables which were found to be significant thus the interconstruct correlations amongst the variables were consistent with the theory.

Table 4.9: Correlations Matrix of EFA variables

		T1	T2	T3	Rev K2	Rev K3	Rev A5	Rev A6	B1	B2	B3	B4	B8
T1	Pearson	1											
	Sig. (2-t)												
T2	Pearson	.701**	1										
	Sig. (2-t)	.000											
T3	Pearson	.475**	.537**	1									
	Sig. (2-t)	.000	.000										
Rev K2	Pearson	.012	.011	-.027	1								
	Sig. (2-t)	.808	.829	.589									
Rev K3	Pearson	.071	.056	.054	.621**	1							
	Sig. (2-t)	.161	.265	.291	.000								
Rev A5	Pearson	.001	.080	.023	.326**	.301**	1						
	Sig. (2-t)	.978	.116	.656	.000	.000							
Rev A6	Pearson	.013	.036	.049	.263**	.372**	.344**	1					
	Sig. (2-t)	.804	.483	.335	.000	.000	.000						
B1	Pearson	.318**	.381**	.281**	.021	.047	.012	.013	1				
	Sig. (2-t)	.000	.000	.000	.683	.358	.817	.794					
B2	Pearson	.156**	.100*	-.004	.108*	.091	.024	.054	.491**	1			
	Sig. (2-t)	.002	.047	.936	.033	.071	.636	.291	.000				
B3	Pearson	.284**	.344**	.267**	.052	.113*	.030	.062	.473**	.352**	1		
	Sig. (2-t)	.000	.000	.000	.306	.026	.559	.218	.000	.000			
B4	Pearson	.404**	.364**	.233**	.045	.054	.002	.077	.560**	.368**	.483**	1	
	Sig. (2-t)	.000	.000	.000	.374	.283	.967	.130	.000	.000	.000		
B8	Pearson	.205**	.197**	.125*	.102*	.106*	.051	.073	.519**	.717**	.311**	.396**	1
	Sig. (2-t)	.000	.000	.013	.043	.037	.319	.148	.000	.000	.000	.000	

Correlation is significant at the 0.01 level (2-tailed).**
Correlation is significant at the 0.05 level (2-tailed).*

Confirmatory Factor Analysis (CFA) and Construct Validity

Having specified how measured variables logically and systematically represented latent constructs, the measurement model was further evaluated using CFA to determine how well the specification of factors matched the data. Of the four components of construct validity in CFA, convergent validity and discriminant validity were used to test the set of variables presumed accuracy to measure the same construct and to measure different constructs respectively. In other words, they determined which variables were correlated with one group, and not correlated with other groups.

Convergent validity

Convergent validity is based on the notion that indicators of a specific construct should converge or share a high proportion of variance in common and was estimated by the size of the factor loading. The rule of thumb was that standardized loading estimates should be 0.5 or higher and ideally 0.7 or higher (Hair et al., 2010).

Discriminant validity

AVE (Average Variance Extracted) analysis was used to explain discriminant validity, which tested whether the square root of every AVE value belonging to each latent construct are larger than any correlation values among any pair of latent constructs. The comparison of AVE with the correlation coefficient was to see if the items of the construct explain more variance than do the items of the other construct. The value of VE for each construct should be at least 0.50. (Zait & Bertea, 2011; Fornell & Larcker, 1981)

Measures for establishing validity and reliability and their thresholds are:

- Reliability: CR (Composite Reliability) > 0.7
- Convergent Validity: CR > AVE (Average Variance Extracted); AVE > 0.5
- Discriminant Validity: MSV (Maximum Shared Variance) < AVE; ASV (Average Shared Variance) < AVE

Using an excel analyses tool called the Stats Tools Package (Gaskin (2012), the measures were calculated as follows:

	CR	AVE	MSV	ASV	TrainInput	Knowledge	Attitude	Behavior
TrainInput	0.810	0.592	0.211	0.074	0.769			
Knowledge	0.771	0.628	0.460	0.160	0.064	0.793		
Attitude	0.512	0.344	0.460	0.158	0.080	0.678	0.587	
Behavior	0.817	0.474	0.211	0.079	0.459	0.129	0.094	0.688

The results highlighted some issues in the measurement model. The latent construct of Attitude has problems in composite reliability (< 0.70), discriminant (AVE < MSV) and convergent validity (AVE < 0.50). This meant that it was not well supported by its own observed variables and was better explained by other variables from a different factor. The latent construct of Behavior exhibited problems in convergent validity (< 0.50) however the AVE value of 0.474 was not significantly far from the threshold which suggested that its observed variables marginally explained the latent construct. These issues were examined again prior to the assessment of the structural model.

Assessment of the Measurement Model

This stage of the analysis was to evaluate how well the specified model fit the data. Since the earlier results pointed to poor construct validity, the assessment results were anticipated to show poor model fit. To confirm this assumption, the full SEM process was carried out. To assess the overall model fit, a number of goodness-of-fit (GOF) measures are available. Each measure is unique. Hair et al., (2010) recommended that at least one incremental index and one absolute index in addition to the chi-square value and associated degrees of freedom should be reported. Here, the overall fit measures used were chi-square test (χ^2), normed fit index (NFI), Tucker-Lewis index (TLI), comparative fit index (CFI), root mean square error of approximation (RMSEA), goodness-of fit index (GFI) and adjusted goodness-of-fit index (AGFI).

Chi-Square (χ^2) GOF

The chi square value represents the difference between the observed covariance matrix and the predicted or model covariance matrix. Although the model chi-square or chi-square goodness of fit is a popular fit index, it had a few problems. Its sensitivity to sample size meant that models were usually rejected when large sample sizes were used (Bentler and Bonnet, 1980;

Jöreskog and Sörbom, 1993) and severe deviations from normality may result in model rejections even when the model was properly specified (McIntosh, 2006). Therefore, Wheaton et al's (1977) relative/normed chi-square ($\chi 2/df$) model fit index was used. Although there was no consensus regarding an acceptable ratio for this statistic, recommendations ranged from as high as 5.0 (Wheaton et al, 1977) to as low as 2.0 (Tabachnick and Fidell, 2007). In this study the chi-square index was 228.335 and the degrees of freedom was 48, resulting in a relative χ^2/df ratio of 4.76 which was very close to the prescribed upper limit.

Normed fit index (NFI)

The NFI is the difference between the chi-square of the null model and the chi square of the target model, divided by the chi-square of the null model. The fit index should vary from 0 to 1 with Bentler and Bonnet (1980) recommending values greater than 0.90 indicating a good fit. This study reported a NFI of 0.859, indicating the overall model fit improved by 85.9%. However there are limitations. When the samples are small, the fit is often underestimated (Ullman, 2001). Furthermore, in contrast to the TLI, the fit can be overestimated if the number of parameters is increased. This problem was overcome by the Non-Normed Fit Index (NNFI also known as Tucker-Lewis Index).

Tucker Lewis index (TLI) or Non-normed fit index (NNFI)

The Tucker–Lewis index (TLI) calculates and compares the normed chi-square values for the null and specified model Hair et al., 2010). (Although the TLI is relatively independent of sample size, sometimes the value of the TLI can indicate poor fit when small samples are used despite other statistics indicating towards good fit. The TLI is usually lower than the GFI, but values over 0.90 or over 0.95 are considered acceptable (Hu & Bentler, 1999). In this study, the TLI index was 0.840 which was considered a reasonable fit.

Comparative fit index (CFI)

The Comparative Fit Index (CFI) is a revised form of the NFI, which is not too sensitive to sample size. Values that approached 1 indicated a good fit. An acceptable cut off value greater than 0.90 is needed to ensure that mis-specified models are not accepted (Hu & Bentler, 1999). This study reported a CFI of 0.884 which meant the model might be mis-specified.

Root Mean Square Error of Approximation (RMSEA)

RMSEA measures how well the model's chosen parameter estimates fits the population's covariance matrix (Bryne, 1998). Regarded as 'one of the most informative fit indices' (Diamantopoulos and Siguaw, 2000) and parsimonious, it will choose the model with lesser number parameters. MacCallum et al, (1996) recommended that RMSEA in the range of 0.05 to 0.10 was an indication of fair fit and values above 0.10 indicated poor fit. In this study, RMSEA was reported as 0.098 which just met the fair fit criteria.

Goodness of Fit Statistics (GFI) and Adjusted Goodness of Fit Statistics (AGFI)

GFI was an early attempt to develop a fit statistics that was less sensitive to sample size. It assesses the variances and covariances accounted for by the model to determine how closely the model comes to replicating the observed covariance matrix (Diamantopoulos and Siguaw, 2000). The possible range of GFI is from 0 to 1, with higher values representing better model fit. Related to the GFI is the AGFI which adjusts the GFI based upon degrees of freedom, with more saturated models reducing fit (Tabachnick and Fidell, 2007). Values for the AGFI should also range between 0 and 1 and it is generally accepted that values of 0.90 or greater indicate well-fitting models. Due to their sensitivity to sample sizes, these two indices are not relied upon as a stand-alone index. In this study, values for the GFI was 0.904 and AGFI was 0.844, representing fair fit.

Based on the variety of model fit indices drawn from absolute fit measures (chi-square test (χ^2), degrees of freedom, GFI, AGFI and RMSEA), and incremental fit indices (NFI, CFI and TLI) to ensure a well-balanced analysis, the measurement model was confirmed to have a fair model fit. The reported values met the marginal threshold for absolute fit measures which were the relative chi-square (4.76), RMSEA (0.098), GFI (0.904) and AGFI (0.844) while the incremental fit indices of NFI (0.859), TLI (0.840) and CFI (0.884) were just below the minimum requirements. Results of the overall measurement model were presented in Table 4.10.

Table 4.10: Results of overall measurement model

Factors	**Std Factor Loading**	**SMC (R^2)**	**Composite Reliability**	**Average Variance Extracted**
Training Input			0.771	0.629
T1. It is my responsibility to practice food hygiene at work.	0.797	0.635		
T2. The relevance of food hygiene and safety training materials helped me understand and become engaged in food hygiene.	0.881	0.776		
T3. The company provides resources for me to practice food hygiene and safety.	0.604	0.365		
Knowledge			0.809	0.592
RK2. There is no risk of food contamination from open cuts or sores on the hand.	0.731	0.534		
RK3. Food contact surfaces used alternately without cleaning to prepare raw and ready to eat foods will not contaminate food.	0.850	0.723		
Attitude			0.512	0.344
RA5. Thawing frozen food at room temperature will not lead to cross contamination.	0.564	0.318		
RA6. Reheating of cooked food or previously prepared foods is not a major concern in food safety.	0.609	0.371		
Behavior			0.806	0.458
B1. I wash my hands with soap and water before starting to prepare food.	0.771	0.595		
B2. If I have a cut or sore on my hand, I cover it before preparing food.	0.694	0.481		
B3. I clean and sanitize all food contact surfaces between preparation of raw and ready-to-eat foods.	0.581	0.337		
B4. I separate raw food from ready to eat foods.	0.664	0.440		
B8. When I am in doubt about the safety of a previously cooked food I throw it out rather than serve it.	0.717	0.514		

All factor loadings are significant at $p < 0.000$.

Issues with the Measurement Model

Although the measurement model was barely specified, there were concerns regarding the construct validity of Attitude and minor disturbances in Behavior. These issues were revisited since they have implications on the measurement theory and identification problems have to be addressed prior to structural model assessment. Hair et al. (2010) highlighted several key issues when developing the overall measurement model. One of the rules dealt with items per construct and identification which stated 'a minimum of three items per factor, preferably four'. Based on the three levels of identification, when a model has more parameters to be estimated than there are variance and covariances, that model is known as an under-identified or unidentified model. The measurement model in question had 2 factors, Knowledge and Attitude, each measured by 2 items only. The parameter summary also showed that the model had 30 parameters, 6 covariances and 16 variances which reaffirmed its under-identified status. One recommendation was to increase the number of manifest variables (Blunch, 2008). Based on this recommendation, deleted items were retrieved and replaced into the Knowledge and Attitude constructs. These items were derived from the EFA process, and displayed the next best factor loadings and Cronbach's alpha before the final extraction and rotation. Reverse item K6 (factor loading = 0.654, communality = 0.428) and reverse item A2 (factor loading = 0.639, communality = 0.409) were added to the latent constructs of Knowledge and Attitude respectively and tested using CFA. Results of the model fit absolute fit indices were 4.46 (relative χ^2), 0.890 (GFI), 0.837 (AGFI), 0.094 (RMSEA), and incremental fit indices of 0.830 (NFI), 0.862 (CFI) and 0.823 (TLI). When compared with the indices of the model before addition of items, the results did not show an

improved model fit. Therefore, re-specification of the under-identified model by increasing the number of manifest variables was not supported.

Table 4.11: Comparison of the measurement models' fit indices

	χ^2/df	GFI	AGFI	RMSEA	NFI	CFI	TLI
Original model	4.76	0.904	0.844	0.098	0.859	0.884	0.840
Re-specified model	4.46	0.890	0.837	0.094	0.830	0.862	0.823

According to Kenny and Milan (2012), not all under-identified models are hopeless. An under-identified model may have some of its parameters identified and model fit can still be estimated 'to make clear what is known and what is unknown'. When the fit of a model is poor, it can be re-specified either as a set of structural equations or as a path diagram. In this case, the latter option was explored. The path diagram was re-specified by adding a direct positive relationship from the exogenous variable of Training Input to the endogenous variable of Behavior. This was based on the result of the correlation matrix in Table 4.9, which suggested inter-construct relationships amongst the variables were significant. With these assumptions, the measurement model's initial and re-specified structural relationship were tested and compared to see which model provided better model fit.

Assessment of Structural Model

This stage of the analysis was to assess the model's initial structural relationship and the re-specified structural relationship to see which one produced better overall fit, using the same criteria that was applied to the measurement model. The purpose of this research was to understand the effects of training input on foodservice employees' knowledge, attitude and behavior in food hygiene. Therefore the structural model was drawn up to explain the hypothesized theoretical relationships between these latent

factors. For this study, the exogenous variable was Training Input while the endogenous variables were Knowledge, Attitude and Behavior. In the initial structural model's relationship, Training Input was hypothesized to have positive direct effect on Knowledge and Knowledge was hypothesized to affect Behavior directly. Knowledge was also an intervening variable between Training Input and Behavior as well as a mediator on Attitude to affect Behavior. Simultaneously, Training Input was hypothesized to affect Attitude directly and Attitude was hypothesized to affect Behavior directly. Like Knowledge, Attitude was an intervening variable between Training Input and Behavior. Based on this initial hypothesized structural relationship, the structural model was tested for relative chi-square, normed fit index, Tucker-Lewis index, comparative fit index, root mean square error of approximation, goodness-of fit index and adjusted goodness-of-fit index relative using the same sample (N=391). For the re-specified structural model, an extra path was drawn from Training Input to Behavior based on the hypothesis that Training Input has a positive direct relationship with Behavior. Results of the goodness-of-fit indices were compared between the two structural models against the GOF indices which showed that the initial structural model only met the criteria for GFI and AGFI while the re-specified structural model met all the absolute fit measures' criteria and CFI but not the incremental indices threshold (Table 4.12). Based on this analysis, the re-specified structural model although mediocre exhibited better model fit and was the preferred structural model.

Table 4.12: Comparison of structural models' fit indices

GOF	χ^2 / df	GFI	AGFI	RMSEA	NFI	CFI	TLI
Threshold	Bet. 2.0-5.0	Bet. 0-1.00	Bet. 0-1.00	Bet. 0.05-0.10	≥ 0.90	Bet. 0.90-1.00	≥ 0.90
Initial model	5.71	0.881	0.810	0.110	0.827	0.851	0.799
Respecified model	4.76	0.904	0.844	0.098	0.859	0.884	0.840

Results of the final structural model can be seen in Table 4.13. Comparisons were made between the standardized factor loadings of the structural model and factor loadings of the measurement model, which

showed the loading estimates to be identical. The final structural model fit was compared with the CFA (measurement) model fit to substantiate validity of the former. The fit indices were found to be identical which strongly suggested the structural model to be adequate.

Table 4.13: Comparison of measurement and structural models fit indices

	χ^2/df	GFI	AGFI	RMSEA	NFI	CFI	TLI
Measurement model	4.76	0.904	0.844	0.098	0.859	0.884	0.840
Structural model	4.76	0.904	0.844	0.098	0.859	0.884	0.840

Table 4.14: Results of final structural model

Factors	Std Factor Loading	SMC (R2)	C.R. (t-value)
Training Input			
T1. It is my responsibility to practice food hygiene at work.	0.797	0.635	NA
T2. The relevance of food hygiene and safety training materials helped me understand and become engaged in food hygiene.	0.881	0.776	13.963
T3. The company provides resources for me to practice food hygiene and safety.	0.604	0.365	11.464
Knowledge			
RK2. There is no risk of food contamination from open cuts or sores on the hand.	0.731	0.534	NA
RK3. Food contact surfaces used alternately without cleaning to prepare raw and ready to eat foods will not contaminate food.	0.850	0.723	8.273
Attitude			
RA5. Thawing frozen food at room temperature will not lead to cross contamination.	0.564	0.318	NA
RA6. Reheating of cooked food or previously prepared foods is not a major concern in food safety.	0.609	0.371	5.817
Behavior			
B1. I wash my hands with soap and water before starting to prepare food.	0.771	0.595	NA
B2. If I have a cut or sore on my hand, I cover it before preparing food.	0.694	0.481	10.674
B3. I clean and sanitize all food contact surfaces between preparation of raw and ready-to-eat foods.	0.581	0.337	10.719
B4. I separate raw food from ready to eat foods.	0.664	0.440	12.429
B8. When I am in doubt about the safety of a previously cooked food I throw it out rather than serve it.	0.717	0.514	11.088
Goodness of Fit Indices χ^2/df = 4.76 NFI = 0.859 TLI = 0.840 CFI = 0.884 RMSEA = 0.098 GFI = 0.904 and AGFI = 0.844			

All factor loadings are significant at $p < 0.000$
Parameter fixed at 1.0 for the maximum-likelihood estimation. Thus, t-values were not obtained (NA) for those fixed to 1 for identification purpose.

To complete the assessment of the structural model, individual parameter estimates were examined against the corresponding predicted paths to confirm that they are statistically significant, in the predicted direction and non-trivial. Figure 4.1 showed the final structural model and its estimated path

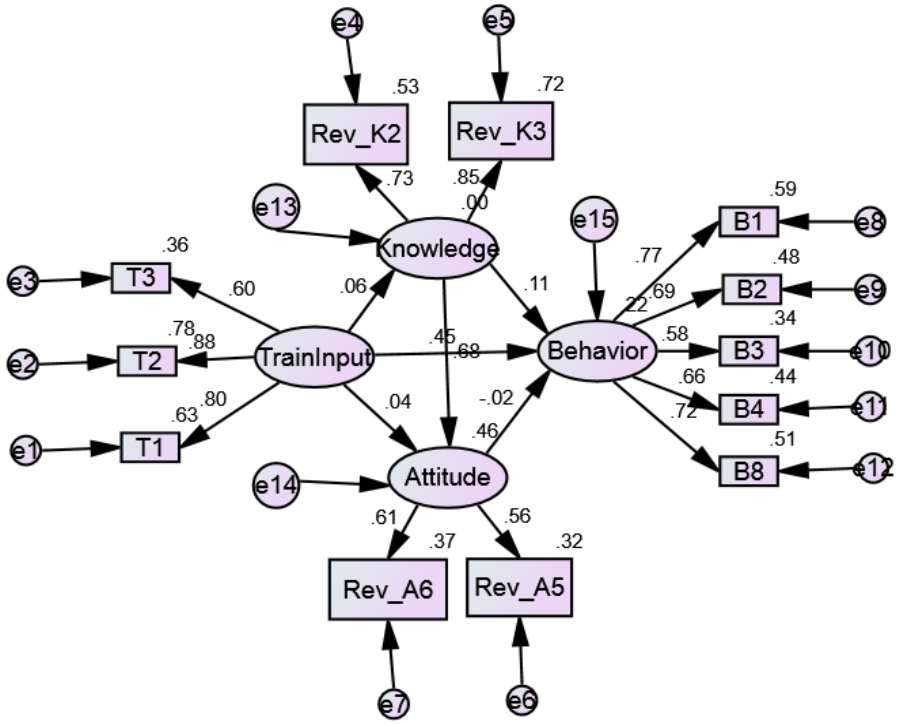
coefficients. Test of individual parameter estimates for statistical significance is based on the ratio of the parameter estimate to its standard error estimate (or t-value) which indicates whether the corresponding path coefficient was significantly different from zero. As a rough guide, coefficients with t-values between +1.96 and -1.96 are considered to be statistically insignificant. Results from Table 4.15 showed that two paths; Knowledge to Attitude and Training Input to Behavior to be significant.

Table 4.15: Path analysis results for the structural model

Path Analysis		**Standardized Coefficient**	**t-value**
Training input →	Knowledge	0.064	1.031
Training input →	Attitude	0.037	0.517
Knowledge →	Attitude	0.676	6.728**
Knowledge →	Behavior	0.114	1.062
Attitude →	Behavior	-0.020	-0.160
Training Input →	Behavior	0.454	6.704**

** Parameter estimates significant at $p < 0.05$

Figure 4.1: Structural Model with Estimated Path Coefficients.



Hypothesis Testing

At the structural model assessment stage, standardized coefficient was used to examine the magnitude of the estimated parameters to provide information about the strength of the hypothesized relationships. It demonstrated the resulting change in an endogenous variable from a unit change in an exogenous variable, with all of the other exogenous variables being held constant. The sign of the coefficient was an indicator of the direction of the structural path between the variables. For this stage of the analysis, the hypothesized relationships between endogenous and exogenous variables were tested to see whether they were consistent with theoretical expectations. Build into this analysis is the specification of the types of relationships that compose the structural model. Path analyses of direct and indirect or mediated relationships were computed using Sobel's test calculator, an online statistical tool and reported in Table 4.16.

Table 4.16: Path analyses and relationships of the structural model

Hypotheses	**Standardized Coefficient**	**t-value**	**Result**
H1: Training Input → Knowledge	0.064	1.031	Not supported
H2: Knowledge → Behavior	0.114	1.062	Not supported
H3: Training Input → Knowledge → Behavior	0.064+0.114=0.178	0.738	Not supported
H4: Training Input → Attitude	0.037	0.517	Not supported
H5: Attitude → Behavior	-0.020	-0.160	Not supported
H6: Training Input → Attitude → Behavior	0.037+(-0.020)=0.017	0.15	Not supported
H7: Knowledge → Attitude	0.676	6.728**	Supported
H8: Training Input →Knowledge →Attitude → Behavior	0.064+0.676+(-0.020) =0.72		Not supported
New H: Training Input →Behavior	0.454	6.704**	Supported

A mediating effect arises when a third variable or construct intervenes between two other related constructs. In this case, knowledge was hypothesized to be a mediator between training input and behavior while attitude was hypothesized as the mediator between training input and behavior. If the paths training input → knowledge → behavior and training input → attitude → behavior

provided good fits, then mediation is supported, and both knowledge and attitude are considered to have mediating roles.

Sobel (1982) test was used to calculate whether the indirect effect of the independent variable on the dependent variable through the mediator variable was significant. It computes the raw (unstandardized) regression coefficients between variables and their standard errors. Using the online Sobel's test calculator (Preacher and Hayes, 2004), the test statistic (t-value) of knowledge was 0.52 and test statistic (t-value) of attitude was -0.19, values which were statistically insignificant thus confirming knowledge and attitude do not have mediating roles. The final structural model was depicted in Figure 4.2.

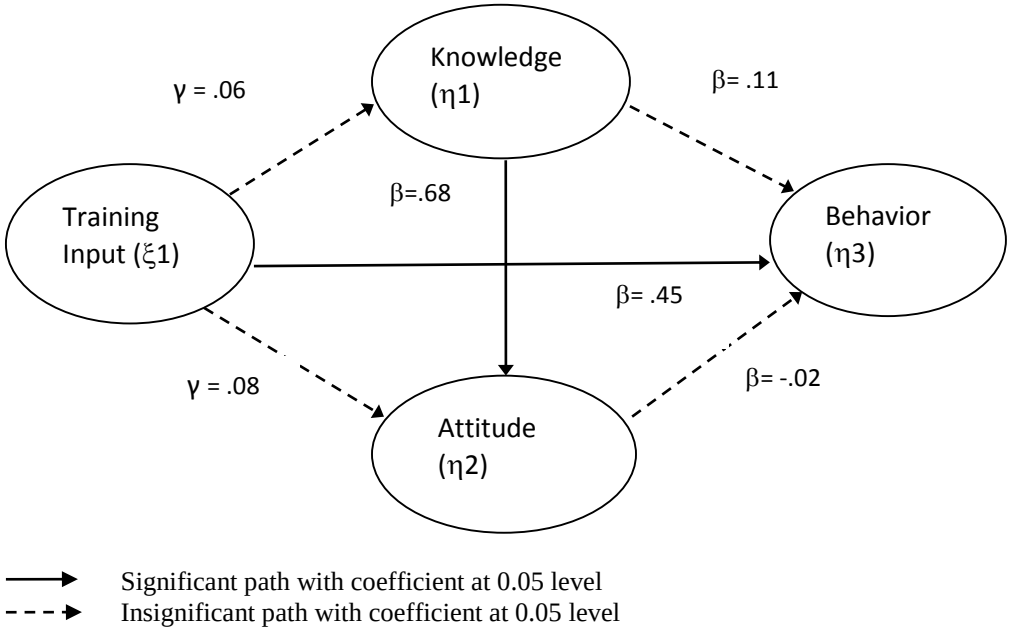


Figure 4.2. Final Structural Model

Comparisons between Foodservice Employees of Chinese and Western Operations

Finally, descriptive statistics for each dimension of the structural model were computed. Independent sample t-test was conducted to determine whether there were any demographic

differences between Chinese and Western foodservice employees and their perceptions of training input, knowledge, attitude and behavior. The means of each dimension were compared with foodservice employees' demographics, food hygiene and safety training background and work experiences using ANOVA. The results determined whether demographics, training background and work experiences had any significant effects on foodservice employees' perception of training input, knowledge, attitude and behavior.

Of the four dimensions, knowledge had the highest score (mean = 6.11), followed by training input (mean = 6.06), behavior (mean = 5.96) and attitude (mean = 4.75). Although knowledge had the highest score, it was not deemed to have a direct relationship with behavior. On the other hand, training input, the second highest score, has a direct relationship with behavior thus this factor is seen to be favorable in promoting food hygiene and safety. Knowledge was found to have a direct relationship with attitude in the model. Since attitude has the lowest score amongst the factors, attention should be paid on knowledge to improve attitude.

Table 4.17: Foodservice employees' perception of food hygiene and safety dimensions

	Overall mean	**Mean**	**Std. Dev**
Training Input	6.06		
It is my responsibility to practice food hygiene at work		6.2	0.98
Relevance of training materials helped me understand and engage in food hygiene.		6.2	0.95
Company provided resources to practice food hygiene and safety.		5.8	1.28
Knowledge	6.11		
There is no risk of food contamination from open cuts or sores on the hand.		6.1	1.68
Food contact surfaces used alternately without cleaning to prepare raw and ready to eat foods will not contaminate food.		6.2	1.49
Attitude	4.75		
Thawing frozen food at room temperature will not lead to cross contamination.		4.9	1.8
Reheating of cooked or previously prepared foods is not a major concern in food safety.		4.6	1.71

Table 4.17: Foodservice employees' perception of food hygiene and safety dimensions (cont'd)

Behavior	5.96		
I wash my hands with soap and water before starting to prepare food.		6.0	1.04
If I have a cut or sore on my hand, I cover it before preparing food.		5.8	1.83
I clean & sanitize all food contact surfaces between preparation of raw & ready to eat foods.		5.9	1.25
I separate raw from ready to eat foods.		6.4	0.81
When I am in doubt about the safety of a previously cooked food, I throw it out rather than serve it.		5.7	1.50

Chinese and Western foodservice employees were compared to see whether there were differences in their perceptions of the four dimensions. Table 4.18 showed that there were significant differences in the mean scores between the two groups with regards to knowledge on risk of contamination from open cut or sore ($t = 1.809$, $p = 0.071$) and the act of throwing away previously cooked food that may be unsafe ($t = -1.721$, $p = 0.086$) at the significant level of 0.1. It appeared that Chinese foodservice operations' employees' awareness of personal hygiene and avoidance of risky foods were not as strong as Western foodservice operations' employees.

Table 4.18: Comparison of mean scores for Chinese and Western foodservice employees in the four dimensions

	Chinese	**Western**	**Mean Diff**	**t-value**	**Sig.**
Training Input					
It is my responsibility to practice food hygiene at work	6.18	6.23	-0.05	-0.520	0.603
Relevance of training materials helped me understand and engage in food hygiene.	6.21	6.22	-0.01	-0.088	0.930
Company provided resources to practice food hygiene and safety.	5.70	5.83	-0.13	-0.970	0.332
Knowledge					
There is no risk of food contamination from open cuts or sores on the hand.	6.23	5.91	0.32	1.809	**0.071***
Food contact surfaces used alternately without cleaning to prepare raw and ready to eat foods will not contaminate food.	6.26	6.04	0.22	1.443	0.150
Attitude					
Thawing frozen food at room temperature will not lead to cross contamination.	4.80	4.93	-0.13	-0.657	0.511
Reheating of cooked or previously prepared foods is not a major concern in food safety.	4.68	4.54	0.14	0.792	0.429
Behavior					
I wash my hands with soap and water before starting to prepare food.	5.93	6.08	-0.15	-1.425	0.155
If I have a cut or sore on my hand, I cover it before preparing food.	5.67	5.93	-0.25	-1.327	0.185
I clean & sanitize all food contact surfaces between preparation of raw & ready to eat foods.	5.79	6.00	-0.21	-1.617	0.107
I separate raw from ready to eat foods.	6.39	6.49	-0.10	-1.181	0.238
When I am in doubt about the safety of a previously cooked food, I throw it out rather than serve it.	5.61	5.88	-0.27	-1.721	**0.086***

* Sig at 0.1

Foodservice Employees' Demographics and Perceptions

The following series of analyses below looked at whether there were significant differences between foodservice employees' demographic information and their perception of training input, knowledge, attitude and behavior. The first Table 4.19 showed whether employees at different job levels perceived the four dimensions differently. Employees at manager and

supervisor levels were categorized as leaders while craft and operatives were categorized as operators. At the significance level of 0.1, leaders were less likely to belief that thawing food at room temperature will lead to cross contamination as compared to the operators' level. In their behavior, operators tend to clean and sanitize food contact surfaces between preparation of raw and ready foods, while leaders tend to separate raw from ready foods more often than operators. Results implied that foodservice employees at managerial and supervisory level's attitude towards cross contamination and food hygiene and safety behavior are not as favorable as employees at craft and operative level. Since this group provides leadership in the foodservice organization, it is important to correct this attitude and behavior.

Table 4.19: Comparison of mean scores for foodservice employees' job level.

	Leaders	**Operators**	**Mean Diff.**	**t-value**	**Sig (2-tailed)**
T1	6.28	6.15	0.13	1.396	0.163
T2	6.21	6.23	-0.02	-0.217	0.828
T3	5.84	5.68	0.16	1.231	0.219
RK2	6.07	6.10	-0.03	-0.223	0.824
RK3	6.13	6.15	-0.02	-0.159	0.874
RA5	4.63	5.11	-0.48	-2.627	0.009*
RA6	4.65	4.58	0.07	0.410	0.682
B1	5.88	6.11	-0.23	-2.142	0.033
B2	5.67	5.90	-0.23	-1.255	0.210
B3	5.86	5.91	-0.05	-0.371	0.711*
B4	6.46	6.42	0.04	0.432	0.666*
B8	5.63	5.84	-0.21	-1.355	0.176

* Sig at 0.1

The employees length of employment in the current job was regrouped into three categories; less than 1 year to less than 3 years; 3 years to less than 7 years; and 7 years to 9 years and above. Table 4.20, showed that employees who have worked 3 to 7 years in the current employment were less likely to wash hands before preparing food, and less likely to cover cuts or sore before preparing food. This indicated that employees who have been in the employment for over 3 years tend to be indifferent towards practicing food hygiene and safety. Therefore, this group has to be targeted for refresher courses or prompted to practice food hygiene and safety.

Table 4.20: Comparison of mean scores for foodservice employees' years of employment in current job

	<1 to <3 yrs	**3 yrs to 7 yrs**	**7 yrs to abv 9 yrs**	**F**	**P**
T1	6.20	6.12	6.28	0.787	0.456
T2	6.21	6.12	6.28	0.819	0.442
T3	5.70	5.62	5.89	1.607	0.202
RK2	6.26	6.17	5.89	1.973	0.140
RK3	6.04	6.19	6.18	0.428	0.652
RA5	2.55	2.45	2.44	0.148	0.863
RA6	5.47	5.00	5.27	1.912	0.149
B1	6.08	5.78	6.05	2.691	0.069*
B2	6.11	5.45	5.71	3.817	0.023*
B3	5.82	5.83	6.00	0.628	0.534
B4	6.38	6.48	6.47	0.604	0.547
B8	5.82	5.52	5.79	1.244	0.289

*Sig at 0.1

Foodservice employees' ages were regrouped into four groups; less than 18 years to 25 years; 26 to 35 years; 36 to 49 years; and 50 years and above. Results of Table 4.21 revealed age group of 36 to 49 years knowledge of food contamination from open cuts or sores was better compared to those who are 50 years and above. The 36-49 years age group also exhibited better knowledge of food contamination from un-cleaned food contact surfaces compared to the less than 18 to 25 years. Finally, the less than 18 to 25 years age group was more likely to cover cuts or sores before preparing food compared to the 26-35 years age group. The results showed inconsistencies in the knowledge of food cross contamination, especially between workers of the younger and older age groups. In the act of personal hygiene, the younger age group was better at this practice than the other groups.

Table 4.21: Comparison of mean scores for foodservice employees' age groups.

	≥18-25 yrs	26-35 yrs	36-49 yrs	50 yrs & abv	F	P
T1	6.10	6.22	6.27	6.19	0.466	0.706
T2	6.10	6.29	6.22	6.22	0.511	0.675
T3	5.69	5.66	5.81	5.84	0.444	0.721
RK2	5.93	5.98	6.36	5.78	2.486	0.060*
RK3	5.82	6.09	6.35	6.03	2.197	0.088*
RA5	4.77	4.85	4.92	4.86	0.101	0.960
RA6	4.44	4.40	4.85	4.58	1.691	0.168
B1	5.95	6.14	5.89	6.04	1.330	0.264
B2	6.34	5.56	5.78	5.63	2.619	0.051*
B3	5.82	6.08	5.78	5.89	1.220	0.302
B4	6.24	6.40	6.51	6.51	1.870	0.134
B8	6.00	5.68	5.65	5.74	0.824	0.481

*Sig at 0.1

Foodservice employees' education level were regrouped and categorized into Tertiary, Vocational, Secondary and Others. In the ANOVA, Table 4.22 showed that perceptions of one's responsibility to practice food hygiene and safety was the weakest in the others group (mean = 5.94) while the group with secondary level education (mean = 6.27) was the strongest. Results also revealed that employees' perceived responsibility increases as the level of education increases. Group with tertiary level education (mean = 7.00) was more likely to wash hands before preparing food than vocational education (mean = 5.80). The level of education facilitated foodservice employees' comprehension of food hygiene and safety.

Table 4.22: Comparison of mean scores for foodservice employees' education level

	Tertiary	Vocational	Secondary	Other	F	P
T1	6.20	6.23	6.27	5.94	2.074	0.103*
T2	5.80	6.33	6.21	6.24	0.487	0.691
T3	5.60	5.87	5.81	5.48	1.289	0.278
RK2	4.80	6.13	6.11	6.03	1.028	0.380
RK3	5.80	5.87	6.15	6.24	0.515	0.672
RA5	5.00	4.83	4.83	5.05	0.248	0.863
RA6	4.20	4.27	4.72	4.35	1.363	0.254
B1	7.00	5.80	5.97	6.14	2.422	0.066*
B2	7.00	6.20	5.71	5.80	1.398	0.243
B3	6.80	6.07	5.83	6.00	1.466	0.223
B4	7.00	6.30	6.47	6.35	1.499	0.214
B8	6.40	6.07	5.67	5.78	0.993	0.396

*Sig at 0.1

Results of Table 4.23 showed that foodservice employees' with different years of employment in the industry were not significantly different in their perceptions of training input, knowledge, attitude and behavior.

Table 4.23: Comparison of mean scores for foodservice employees' years of industry employment

	None	**<1yr**	**1-3 yrs**	**3-6 yrs**	**6-10 yrs**	**> 10 yrs**	**F**	**P**
T1	5.20	5.82	6.18	6.09	6.16	6.32	2.352	0.040
T2	5.80	6.12	6.13	6.17	6.03	6.31	1.224	0.297
T3	5.40	5.59	5.92	5.72	5.43	5.86	1.353	0.241
RK2	6.20	6.53	6.11	5.83	6.61	5.96	1.926	0.089
RK3	6.80	5.71	6.08	5.92	6.44	6.13	1.223	0.298
RA5	4.00	4.53	5.00	4.81	5.02	4.87	0.466	0.802
RA6	5.60	4.18	4.76	4.25	4.77	4.65	1.224	0.297
B1	6.00	6.05	5.82	6.08	6.08	5.98	0.395	0.852
B2	6.20	6.41	6.18	5.85	5.87	5.61	1.241	0.289
B3	6.00	6.06	5.71	6.28	5.84	5.82	1.440	0.209
B4	6.40	6.47	6.34	6.38	6.34	6.50	0.605	0.696
B8	6.40	5.88	5.89	5.68	5.59	5.73	0.442	0.819

From Table 4.24, foodservice employees who had 1 to 3 years and over 5 years of food hygiene and safety practice were significantly different in their perceptions on responsibility to practice food hygiene and safety, relevance of training materials and covering a cut or sore before preparing food. Those who have longer food hygiene and safety practice displayed greater sense of responsibility and higher regard for training materials. On the other hand, employees with shorter practice of food hygiene and safety were more likely to cover cuts or sores.

Table 4.24: Comparison of mean scores for foodservice employees' years of food hygiene and safety practice

	>1 yr	**1-3 yrs**	**3-5 yrs**	**>5 yrs**	**F**	**P**
T1	6.00	5.94	6.15	6.35	4.081	0.007*
T2	6.05	5.88	6.10	6.38	5.923	0.001*
T3	5.51	5.57	5.50	5.93	3.142	0.025
RK2	5.90	6.35	5.85	6.10	1.107	0.346
RK3	6.13	6.06	5.82	6.24	1.361	0.254
RA5	4.85	4.62	4.78	4.97	0.680	0.564
RA6	4.54	4.54	4.40	4.70	0.563	0.639
B1	6.15	5.91	6.10	5.96	0.738	0.530
B2	6.41	6.09	5.80	5.57	3.169	0.024*
B3	5.92	5.83	5.81	5.91	0.142	0.934
B4	6.34	6.31	6.47	6.49	0.981	0.402
B8	5.90	5.68	5.77	5.71	0.220	0.883

To analyze the effects of different types of training on foodservice employees' perceptions, the employees were further classified into Certified Training, which comprised of FEHD food hygiene managers and supervisors, Non-Certified Training ad No Training. When compared for their mean differences, Table 4.25 showed there were significant difference between the groups with no training and certified training in their perceptions of responsibility to practice food hygiene and safety, relevance of training materials and the separation of raw from ready to eat foods. It showed that group with certified training have greater responsibility (mean = 6.31) and higher regard for training material (mean = 6.32) and more likely to separate raw from ready to eat foods (mean = 6.53).

Table 4.25: Comparison of mean scores for foodservice employees' type of training

	No Train	**CertTrain**	**NC Train**	**F**	**P**
T1	5.87	6.31	6.21	5.803	0.003*
T2	5.91	6.32	6.14	5.416	0.005*
T3	5.56	5.78	5.92	1.383	0.252
RK2	6.19	6.09	5.94	0.368	0.692
RK3	5.94	6.22	6.02	1.166	0.313
RA5	2.64	2.43	2.52	0.389	0.678
RA6	5.31	5.20	5.40	0.312	0.732
B1	5.89	6.04	5.90	0.892	0.411
B2	6.06	5.61	6.16	3.270	0.039
B3	5.66	5.97	5.79	1.914	0.149
B4	6.23	6.53	6.29	5.346	0.005*
B8	5.79	5.66	5.94	0.875	0.418

The number of years since foodservice employees obtained their food hygiene and safety certificates were compared and analyzed. Results of Table 4.26 showed that those who have held the certificate for over 5 years agreed that training materials were relevant and company provided resources but were least likely to cover cut or sore before preparing food. Those in the 3 to 5 years group were the least knowledgeable in the risk of food contamination from open cuts and sores. The tendency to throw away food thought to be unsafe decreases as the length of holding certificate increases.

Table 4.26: Comparison of mean scores for foodservice employees' years of holding food hygiene and safety certificate

	>1 yr	**1-3 yrs**	**3-5 yrs**	**>5 yrs**	**F**	**P**
T1	6.20	6.24	6.27	6.44	1.175	0.320
T2	6.33	6.05	6.29	6.48	2.809	0.040*
T3	5.84	5.58	5.40	6.05	3.606	0.014*
RK2	6.08	6.58	5.69	6.03	2.455	0.064*
RK3	6.22	6.29	6.04	6.27	0.346	0.567
RA5	4.63	4.76	5.08	4.92	0.567	0.637
RA6	4.51	4.56	4.35	4.84	1.030	0.380
B1	6.27	6.15	5.87	5.96	2.105	0.100
B2	6.29	6.36	5.40	4.96	8.522	0.000*
B3	6.18	5.96	5.75	5.98	1.127	0.339
B4	6.60	6.62	6.38	6.53	1.212	0.306
B8	6.35	6.00	5.38	5.27	6.806	0.000*

CHAPTER V

DISCUSSION AND CONCLUSIONS

The structural model of training input on knowledge and attitude and their influence on food hygiene and safety behavior was established and the causal relationships between the four dimensions were identified. Results of the descriptive statistics helped to enhance the analysis and were incorporated in the discussion. Based on the objectives of this study that were listed in chapter one, the results were deliberated and where appropriate recommendations were suggested.

The first objective was to assess the structural relationships of training input, knowledge, attitude and behavior, followed by three related objectives to substantiate the mediating effects of knowledge on behavior, attitude on behavior and knowledge on attitude. Results of the path analyses and structural relationships in Table 4.16, p.98 showed that training input do not have positive effects on either knowledge or attitude of Hong Kong foodservice employees. Furthermore, the mediating effects of knowledge and attitude were not supported. Based on this study, the hypothesis that knowledge and attitude respectively intervene training input's on behavior do not apply to this group of Chinese and Western foodservice employees. On the other hand, a newly posited direct relationship between training input and behavior was significant and supported. To summarize, this research established two distinct and independent relationships

which are the direct relationship between knowledge and attitude, and the direct relationship between training input and behavior.

The new path discovered from the structural model is the positive and direct relationship between training input and behavior. Studies on the effectiveness of food hygiene training at improving behavior had been controversial with authors such as Cohen et al. (2001); Cotterchio et al. (1998); Kneller and Bierma, (1990); Mathias et al. (1995); McElroy and Cutter (2004); Roberts et al. (2008), finding food safety training successful at improving behaviors whilst others (Casey and Cook, 1979; Howes et al., 1996; Mathias et al., 1994; Wright and Feun, 1986) reported that training was not successful. The review of food safety and food hygiene training studies by Egan et al (2007) was very useful to pull out the reasons for the discrepancies. Most of these studies had different criteria of training effectiveness, different types of training programs, various organizations, and a host of other variables which made comparisons inconclusive and inconsistent. Nevertheless, food hygiene training programs were found to benefit restaurants that were not part of chains or large franchises (Kassa et al., 2010), and food premises which included food hygiene training as part of business practice had higher inspection scores (Kirby & Gardiner, 1997). Food hygiene training was seen by Mortlock, Peters and Griffith (2000) as part of a control strategy to bring about behavioral change if it is based on the principles of HACCP system. Anding, Boleman and Thompson (2007) found participants made significant improvements in food safety practices that can decrease the risk of foodborne disease after the completion of a retail food safety education program.

Several results from this research highlighted the importance of having training as a control tool in an organization's food safety management system. Employees with certified training and longer practices in food hygiene and safety have greater sense of responsibility and higher regard for training materials although some of their behavior in personal hygiene was not desirable. Other demographic information revealed that the number of years employed in the

current job can take its toll on the morale of foodservice employees. Those who are 3 to 7 years into the job without career progression may feel stagnant and less motivated to comply with food safety regulations. This study suggests that this group can be targeted for refresher courses in food hygiene and safety. Under the age groups category, employees' knowledge about personal hygiene and cross contamination dropped as age increased, and the tendency to practice personal hygiene dropped as one gets older. An occupational phenomenon known as skill decay is prevalent in all organizations. Based on US Department of Labour estimates, Harris and Brannick (1999) pointed out that 50% of employees' knowledge and skills become outdated every 30 to 36 months. With 55.5% of the respondents having over 10 years of foodservice industry experience, employees may need to undergo training and recertification.

It is important to realize that formal food hygiene training is not a waste of time and be seen as promising in that training influences important contributors of behavior. Training moves people in the right direction (Brannon et al., 2009). Of the 391 foodservice employees that participated in the survey, 66% have formal training. The study also found that employees with certified training and those who have practiced food hygiene and safety for over 5 years displayed greater sense of responsibility and higher regard for training materials. When asked to identify important facilitators in learning food hygiene and safety, training courses were ranked as the third most important contributor. Inadequate training was identified as the third most significant constraint in preventing the practice of food hygiene and safety. Formal training is beneficial in reinforcing employees' food safety behaviors as demonstrated in the stronger likelihood to separate raw from ready to eat foods. This is especially true when basic restaurant experience does not provide opportunity for practicing proper food safety practices within the operation. Thus the relevance and importance of training cannot be neglected.

The other half of this research found that knowledge has a direct relationship with attitude but attitude does not have a mediating role on behavior which leads to a discontinuation

of relationship between attitude and behavior. These findings were consistent with studies by Rennie (1994) whose evaluation of food hygiene education concluded that knowledge in food hygiene and safety do not necessarily translate into practice. Ehiri, Morris & McEwen (1997) backed this notion that knowledge is not the main precursor to behavioral change. Walker, Pritchard and Forsythe (2003) interviewed over four hundred food handlers in UK and found their food hygiene knowledge to be questionable. Powell *et al.*, (1997) and Kirby & Gardiner (1997) also played down the significance of knowledge and found no relationship between the level of knowledge of the staff and the hygiene standard of the premises. In this study, the mean score for knowledge is the highest among the four dimensions in this model. This may be due to a high number of employees (55.5%) with over 10 years of service in the foodservice industry and approximately the same number (57.9%) who have over 5 years of food hygiene and safety practice. The long exposure and repeated performance of food hygiene activities may have facilitated employees' food safety knowledge. Although perceptions about knowledge is strong, knowledge about cross contamination is still a concern especially for employees aged 50 years and above, between 18 to 25 years and those working in Western foodservice operations. Moreover the mean score for attitude, which has a direct relationship with knowledge, is the lowest, which suggest further issues in employees' beliefs about food hygiene and safety.

In the analysis between employees' job level and food hygiene and safety, results revealed managers and supervisors were uncertain in their beliefs regarding temperature control and cross contamination. Furthermore, their practice of cleaning and sanitizing between raw and cooked food preparation was reported to be weak. Employees at craft and operative levels were unsure about the separation of raw from ready to eat foods. A number of authors (Noe and Schmitt 1986; Seyler et al. 1998; Griffith 2000) have noted that managers/supervisors have an important role in setting an appropriate culture within the work environment and providing conditions that facilitate behavioral change. In addition, it is important that managers and

supervisors in their leadership role have a firm grasp of food safety and exercise stronger beliefs and attitude in the practice of food hygiene.

This pattern concerning length of exposure to food hygiene and safety practices, the length of time since last food hygiene certification and the level of the job position, is consistent with Ghezzi and Ayoun (2012) empirical findings of food safety in the US catering industry, in which they reported that older groups demonstrated better food hygiene knowledge and management were better at practicing food safety due to the provision of training. Foodservice employees who have held food hygiene certificates for longer periods with longer exposure to food hygiene and safety and occupy more senior positions tend to be more responsible and more knowledgeable about handling food hygiene incidents. The same also apply to fresh employees with recently gained food hygiene certificates. However employees who have been in a job for over a year and less than five seem to be less sure of food hygiene practices. Workers who are stagnant in a position may exhibit complacency and uncertainty in their career progression may be a reason for their laissez faire attitude at work. The authors recommended that training should not focus only on 'leaders' although they are important resource handlers. Other foodservice personnel should be trained as they come into direct contact with food and training should not focus only on content. Training should ensure employees understand what they have learnt and have a chance to implement them at work.

The disparity between knowledge, attitude and behavior in the real work context are often very intimidating for foodservice employees, especially those who are new to the field. They are frequently caught in limbo between application of theoretical knowledge and the establishment's business objectives. To remain profitable, cost cutting measures, time saving methods are important to foodservice operations, especially those which are independently operated. Therefore, acts such as discarding of dubious food may be scrutinized and the frequent washing of hands is seen as a time wasting activity as it encroaches into food preparation time. The fine

line between theory and practice are blurred when certain activities are frowned upon even though they are technically correct. Without proper guidance foodservice employees can become disoriented. These findings were consistent with a study by Griffith and Clayton (2005) who found that improved knowledge will lead to improved practices but they also reported that attitude may hinder improvements in staff practices. In his study on University restaurants' employees' food sanitation knowledge, attitude and behavior, Ko (2011) found the three factors to be positively related to each other but attitude was a mediator for knowledge on behavior. The triadic relationship between knowledge, attitude and behavior has always been problematic. Clayton, Griffith Price & Peters (2002) discovered 61% of food handlers who had received training admitted to 'sometimes' or 'often' not carrying out food safety actions. Although there isn't a simple link between training, knowledge and food safety behavior, without a doubt, there is a direct relationship between knowledge and attitude, which makes it important to improve employees' knowledge through training to form positive attitude that fortifies desired food hygiene and safety behavior.

The last two objectives of this research were to identify favorable and unfavorable factors in the transfer of food hygiene and safety. Factors conducive to learning food hygiene and safety were closely attached to their job routine such as on the job work experiences and training. Although FEHD resources was also one of the top factors, the findings suggest that food hygiene and safety education has to come from within the organization and work environment, supplemented by external resources from FEHD. Barriers to learning food hygiene and safety are insufficient staff, time constraints, inadequate training and physical facility constraints. Again these factors are related to the organization and work environment.

Recommendations

Recommendations will be confined to the empirical and theoretical findings of this research and will not attempt to elaborate on factors that are outside the domain of this study. Food safety training helps an establishment to improve their employees' compliance with food safety guidelines. With a plethora of training, it is important to establish the type of training to incorporate in the food hygiene management system that is relevant and blends into the work environment. Formal training is necessary as it delivers a strong message about the organization's stance on food safety and provides fundamental knowledge in food hygiene and safety. However, Pilling et al. (2008), cautioned against the over reliance on mandatory training. This type of training enabled food handlers to comply with a few specific food safety behaviors but may not improve their overall knowledge of proper food safety practices. Mandatory training with doses of refresher course are recommended to reinforce and revitalize foodservice employees' knowledge of food hygiene and safety. For small food businesses with limited resources, structured on the job training or refresher training is just as effective as formal training (Worsfold, 2005). This form of training can also be used to address skills decay, an issue associated with a time lapse upon the completion of training. Foodservice employees regarded training courses as important facilitators in learning food hygiene and safety. When asked about the type of non-certified training, 44% of the respondents replied that it was acquired through work experiences in the foodservice industry. Therefore, on the job training can play an important role in improving knowledge and changing employees' behavior to implement safer food handling.

Earlier discussions highlighted the misalignment of food safety training programs' objectives and the outcomes expected from foodservice employees. Most training focus on increasing food safety knowledge and not much about safe food handling practices or behaviors. Theory based models can be used to understand food handlers expectations to interact behavior with their beliefs and knowledge. Factors such as employees' characteristics, training venue

should not be neglected as it is just as important for the trainees to understand why they have to practice food hygiene and safety not just what and how. In their meta-analysis of food safety training, Soon, Baines & Seaman (2012), advocated the combination of standard training and social cognitive behavioral interventions. When supported by appropriate resources, environment and organizational system, they found it to be successful in improving hand hygiene behavior.

Another aspect that requires attention is the knowledge, attitude and behavior relationship. Knowledge is a concept, which cannot be seen but only able to observe its effects. According to Sveiby (1997), knowledge is the capacity to act. Knowledge is merely the remembering of information. An individual's behavior and performance depend on knowledge that has been acquired through learning, practice and experience. Training is just a process to acquire knowledge. Results of the research showed knowledge to be disassociated from training input and became an independent construct having a direct relationship with attitude. For knowledge acquisition to be effective, it has to be attached to the personal dimension of foodservice employees. Training programs are perceived to be a fulfilment of company objectives that are not intrinsically tied to the employees' personal goals. Establishments need to build incentives and develop training programs that captures the motivational factors and beliefs of employees so that they can see the relevance to their work environment. The idea is to drive positive messages which will translate into positive attitude.

In the structural model, the relationship between the attitude and behavior dimensions was not established. Since the desired outcome is the performance of food hygiene and safety in the workplace, a link between attitude and behavior is important. According to Wicker (1969); Kahle & Berman (1979) the view that attitudes have no effects on behavior can be rejected with a high degree of confidence. The precise nature of attitude-behavior effects depend on the substantive domain under investigation. In this instance, the inclusion of social cognitive behavioral interventions such as the theory of planned behavior helps to identify the behavioral

antecedents for learning of food hygiene and safety. The theory of planned behavior has been used quite extensively in recent food safety research. The theory states that intention to perform the behavior is the best predictor of a person's behavior and that intention is based on three antecedents which are: attitude, subjective norm and perceived behavioral control (Ajzen, 1991). This theory may be useful to undertand and establish a link between attitude and behavior.

The organizational culture of the industry has a strong influence on foodservice employees' attitude and beliefs. Chinese foodservice operations are predominantly based on an apprenticeship system. Young cooks learn the trade through more senior Chefs, therefore concepts about food hygiene and safety are passed down from person to person. Certain cooking practices are considered safe although it is perceived to be missing the food safety target, for example. the service of undercooked foods. Chinese foods has always involved some form of heat transfer unlike Western foods which contains categories of cold foods e.g. salads and appetizers. This concept of cooked or hot foods in Chinese cooking took away the need to be cautious of food hygiene and safety. Another impact is the organizational structure and commercial nature of foodservice establishment. Foodservice employees are caught in between adhering to food safety objectives or food business objective. Cost cutting measures are achieved by engaging in acts that are not wasting time and resources. To avoid misunderstanding and confusion due to company policies or common practices, HACCP framework must be at the forefront to steer food hygiene and safety education and training. Griffith, Livesey and Clayton (2010) introduced the concept of food safety culture to improve foodservice operators' safety performance in foodservice businesses by integrating safety management systems with workforce values, beliefs and behaviors thus reducing the risk of foodborne disease.

Factors other than those identified from the results of this study have been found to affect the application of food hygiene and safety in the workplace. Insufficient staff is listed as the most significant barrier to practice food hygiene and safety. Reliance on part-time staff and space

constraints are challenging food hygiene and safety standards. Prior studies suggest that it is necessary to look beyond the training context to understand its effectiveness. Issues such as managerial support, the availability of equipment and tools, training and pre-training motivation, personal values and beliefs can all influence the extent to which individuals react to training. Thus, further research may need to explore a host of other factors, such as organizational, individual, cultural dimensions, legislation and environmental.

Limitations of the Study

The lack of interest and participation from the foodservice industry resulted in an extended period of time for questionnaire administration. Even with an extended period, response from Chinese foodservice operations were insufficient to make up the numbers for proportionate sampling. Thus the sampling frame became a convenience sample. One reason for their refusal could be the type of foodservice operations. Being independent operators, productivity and profitability are more important than filling up questionnaires. This type of foodservice employees may require a shorter and simplified version questionnaire. From the demographic profile, majority of respondents completed secondary school education and they may find the language in the questionnaire too academic and deter them from participating. The use of layman's language, professional jargon and contextualized content can encourage participation in future studies. Some respondents experienced questionnaire fatigue and adopted a frivolous approach to complete the questionnaire. This may affect the quality of the data and information may not truly represent foodservice employees' thoughts and feelings. To avoid response bias, a number of negatively worded statements were included in the questionnaire. Although this procedure has its advantage, it may require additional effort to interpret the questionnaire and foodservice employees' may be discouraged. Furthermore, the process could introduce systematic

measurement errors and unexpected factor structures (e.g., Netemeyer, Bearden, and Sharma 2003). To target foodservice employees, simple, brief and work-related questionnaires are more preferable than research and academic oriented style questionnaires. Since the questionnaire required self-reported analysis, the responses would inevitably contain elements of self-bias. The survey was conducted with independent operators therefore the results could not be generalized to other types of foodservice operations.

Future Research

This study was conducted with employees of independent foodservice operations. These small to medium sized operations have organizational structure that is different to large chains or multi-unit operations. Their limited resources may hinder the implementation of a formal food hygiene management system and could be the reason for some of the unfavorable food hygiene scores. Future studies can be directed with large scale or multi-unit operations and results can be compared to determine whether business size has any impact on foodservice employees' knowledge, attitude and behavior. During the specification of the measurement model, there were issues with the latent construct of attitude which failed to meet the composite reliability, convergent and discriminant validity threshold. There was a minor issue with the convergent validity of the behavior construct. To overcome these issues, it is recommended that the attitude and behavior constructs go through the EFA process again. It is also recommended that the number of items which measure each construct should not be restricted to a pre-determined quantity a priori for each measurement criteria, as this may exploit the full potential of exploratory factor analysis to assess the construct's composition. Further research may consider deconstructing training input into three separate and standalone constructs of trainee characteristics, training design and work environment and from there, develop another structural

model to explain the relationships of these new constructs with knowledge, attitude and behavior in the food hygiene transfer process. Avoid excessive use of negatively worded statements in the questionnaire design, as it can complicate comprehension, interpretation and analysis. The questionnaire design has to consider the demographics of target respondents and their capacity to respond to the survey.

The structural model discovered that training input is independent of knowledge and two independent stand-alone relationships exist; one between training input and behavior, and the other between knowledge and attitude. Theoretically, this may mean that the relationship between knowledge and attitude is merely the feeding of information to the mind and the interpretation of this information without resulting in behavior. In the other relationship, training merely resulted in the performance of actions without knowing the reasons for these actions. It may be worthwhile to investigate how a connection can be developed between knowledge and training input so that foodservice employees understand the reasons and importance of food hygiene and safety. Finally to complete the loop, the investigation needs to be extended to explore the relationship with behavior, in order to achieve the desired behavioral outcome of practicing food hygiene and safety in the workplace.

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APPENDICES

Appendix 1: Approval from OSU Institutional Review Board

Oklahoma State University Institutional Review Board

Date: Monday, July 22, 2013

IRB Application No HE1353

Proposal Title: A Model of the Food Hygiene Transfer Process

Reviewed and Processed as: Exempt

Status Recommended by Reviewer(s): Approved Protocol Expires: 7/21/2016

Principal Investigator(s):

Mei Leng NG
/F Hanwin Mansion, 71 Lyttell
Hong Kong,

Hailin Qu
146 HES
Stillwater, OK 74078

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

- The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval. Protocol modifications requiring approval may include changes to the title, PI, advisor, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Dawnett Watkins 219 Cordell North (phone: 405-744-5700, dawnett.watkins@okstate.edu).

Sincerely,

Shelia H. Kennison

Shelia Kennison, Chair
Institutional Review Board

Appendix 2: Survey Questionnaire

Dear Food Service Employees,
各位膳食服務從業員：

I am a PhD student majoring in Hospitality Administration. I would like to invite you to participate in this study which investigates foodservice employees' perception of food hygiene training and practices in the workplace. The purpose of this research is to study the relationship between training and foodservice employees' knowledge, attitude and behavior in food hygiene. Results from this study will help foodservice operations develop effective food safety practices and enhance food quality.
您好！本人現正修讀酒店管理博士研究課程，誠邀你參與這次研究，探討膳食服務業僱員對於食物衛生培訓與工作間實踐有關操守的看法。本研究的目的，旨在鑽研培訓與膳食服務業僱員對於食物衛生的知識、態度和行為之間的關係。研究結果將有助業內營運商研發有效的食物安全操守，提升食物質素。

Your participation is very important since this survey is distributed to a selected group of foodservice industry employees. You are invited to fill in a questionnaire which collects information about your experience, attitude and practices in food hygiene. The survey will only take about 15 minutes. You should be at least 18 years to participate in this survey.
這次問卷調查只會分派予一批經過挑選的膳食康務業僱員填寫，你的參與舉足輕重，誠邀你填寫這份問卷，用以收集你在食物衛生上的經驗、操行與態度等資料，約花 15 分鐘即可完成。你必須年滿 18 歲，方可參與這次問卷調查。

There are no personal risks greater than those encountered in daily life by participating in this study. The data collected from this survey will be used for education and research purposes only. The information will be kept strictly confidential. Your participation is completely ANONYMOUS and VOLUNTARY. You may choose to discontinue with this study at any time and will not result in penalty or loss of benefits to which you are entitled.
相對日常生活遇到的風險而言，本研究或會招致的個人風險更小。問卷所得資料只會用作教育及研究用途，並會嚴格保密。您的參與全屬不記名和自願方式，可以選擇在任何時候中止參與，並不會招致懲罰或利益損失。

If you have any questions about this study, please contact the principal investigator Ms. Mei Leng Ng, a PhD candidate in the School of Hotel and Restaurant Administration at Oklahoma State University, USA (email: ngmeileng.hk@gmail.com; telephone: 852-90949447). If you have questions about your rights as a research volunteer, you may contact Dr. Shelia Kennison, IRB Chair, 219 Cordell North, Stillwater, OK 74078, 405.744.3377 or irb@okstate.edu .
如果你對於本研究有任何疑問，請與本人伍芙玲女士聯絡。本人是美國俄克拉荷馬州立大學酒店及餐飲管理學院博士研究生，亦是這次研究的首席研究員（電郵地址：ngmeileng.hk@gmail.com；電話：852-90949447）。如果你對於作為志願受訪者應有的權利有疑問，歡迎與 Shelia Kennison 博士聯絡，地址 IRB Chair, 219 Cordell North, Stillwater, OK 74078，405.744.3377，電郵 irb@okstate.edu。

Thank you for your time and cooperation.
佔用你寶貴時間，對你的合作非常感謝！

Mei Leng Ng
PhD student
School of Hotel and Restaurant Administration
Oklahoma State University
美國俄克拉荷馬州立大學
酒店及餐飲管理學院
博士研究生
伍芙玲謹啟

Okla. State Univ.
IRB
Approved 7-22-13
Expires 7-21-16
IRB # HE-13-53

Section A: Your Personal Information
甲部：你的個人資料

Please answer the following questions by ticking ☑ the box that closely matches your answer.
請回答以下問題，選取最接近你心目中的答案，在相關空格內加上☑號。

1. What is your current job title?
   你現在擔任甚麼職務？

JOB TITLE 職銜	
☐ WESTERN RESTAURANT 西菜餐廳	☐ CHINESE RESTAURANT 中菜餐廳
☐ Executive Chef 行政總廚師 ☐ Executive Sous Chef 助理行政總廚師	☐ Executive Chinese Chef 中菜行政總廚師 ☐ Executive Chinese Sous Chef 助理中菜行政總廚師
☐ Sous Chef 助理行政總廚 ☐ Chef de Partie 廚師主管 ☐ Specialist Cook 特色菜廚師	☐ Chief Cook/No. 1 Cook 頭鑊 ☐ No. 2 Cook 二鑊 ☐ No. 3 Cook 三鑊 ☐ Staff Cook/ General Cook/ Service Cook/Production Systems Assistant 打荷/ 普通廚師/ 食品製作助理 ☐ Pantry Cook/ Saucier 幫上什 ☐ Vegetable Cook 蔬菜廚師 ☐ Specialty Chef/ Asian Chef/ Sushi Chef/ Japanese Chef/ Thai Chef 特色菜廚師/ 亞洲菜廚師/ 壽廚師/ 日本菜廚師/ 泰國菜廚師
☐ Baker 麵包師傅 ☐ Pastry Cook 甜品師傅 ☐ Cook (Western) 廚師 (西菜) ☐ Junior Cook (Western) 見習廚師	☐ Junior Cook/No. 4 Cook and below (e.g. butchery, barbecue, stove, vegetable, dim sum) 見習廚師/ 廚或以下（如：砧板、燒烤、爐、蔬菜、點心） ☐ Vegetable Cook Helper 蔬菜廚助手 ☐ Dim Sum Fryer 煎炸工 ☐ Steamer 蒸籠工 ☐ Trimmer 發乾貨員 ☐ Dim Sum Cook (e.g. dough handler, content mixer) 點心廚師（如：麵糰、辦餡）
☐ Kitchen Helper 廚房雜工 ☐ General Staff – (Kitchen/Restaurant) 食物處理員 ☐ Pantry Helper 傳菜員	☐ Kitchen Helper/ Steward/ Pantry Helper 廚房雜工/ 管事/ 傳菜員 ☐ General Staff - Food handler 食物處理員

2. How long have you been employed in this current job?
你现職工作多久？

☐ Less than 1 year 1年以下
☐ 1 year – less than 3 years 1年至3年以下
☐ 3 years – less than 5 years 3年至5年以下
☐ 5 years – less than 7 years 5年至7年以下
☐ 7 years – less than 9 years 7年至9年以下
☐ 9 years or above 9年以上

3. Which type of employee are you? ☐ Full time 全職 ☐ Part time 兼職
你是哪種僱員？

4. What is your gender? ☐ Male 男 ☐ Female 女
你的性別

5. What is your age range?
你的年齡介乎

☐ 18 years or below 18 歲或以下
☐ 18 - 25 years 18歲至25歲
☐ 26 - 30 years 26歲至30歲
☐ 31 - 35 years 31歲至35歲
☐ 36 - 40 years 36歲至40歲
☐ 41 - 49 years 41歲至49歲
☐ 50 years or above 50歲或以上

6. What is your highest level of education?
你的最高教育程度

☐ University Degree or above 大學學位或以上
☐ Associate Degree or equivalent 副學士學位或同等學歷
☐ Professional Dip./ Higher Dip./ Dip. or equivalent 專業文憑/ 高級文憑/ 文憑或同等學歷
☐ Certificate/Advanced Certificate or equivalent 証書/ 高級証書或同等學歷
☐ Secondary 5 – 7 中學五年級至七年級
☐ Secondary 3 – 4 中學三年級至四年級
☐ Others 其他

7. Your length of employment in foodservice:
你受僱於膳食服務業工作的年期：
Average Years of Catering Industry Experience Before Occupying this Position (Please tick ☑ the box).
擔任現職前從事飲食業工作平均年數（在相關空格內加上☒號）。

☐ No experience 無經驗	☐ Less than 1 year 1年以下	☐ 1 year - less than 3 years 1年至3年以下	☐ 3 years - less than 6 years 3年至6年以下	☐ 6 years - less than 10 years 6年至10年以下	☐ 10 years or above 10年或以上

Section B: Your Food Hygiene and Safety Experience
乙部：食物衛生與安全經驗

Please describe your background knowledge and experiences in food hygiene and safety training. Tick ☑ the box that closely matches your answer.
請描述你的知識背景與食物衛生及安全培訓。選取最接近你心目中的答案，在相關空格內加上☑號。

1. How long have you practised food hygiene and safety? 你在食物安全方面擁有多少經驗？
   - ☐ Less than 1 year 1年以下
   - ☐ Between 1-3 years 1年至3年
   - ☐ Between 3-5 years 3年至5年
   - ☐ Over 5 years 5年以上

2. What type of food hygiene and safety training have you attended?
   你有否參與哪種食物衛生及安全培訓?
   - ☐ *FEHD food hygiene manager certificate, please answer Q3 & 4
     *食環署食物衛生經理証書課程, 請回答問題三及四
   - ☐ *FEHD food hygiene supervisor certificate, please answer Q3 & 4
     *食環署食物衛生督導員証書課程, 請回答問題三及四
   - ☐ Non-certified training, skip Q3 & 4, go to Q5
     非認證培訓, 請跳過問題三及四, 回答問題五
   - ☐ Never attended any training, please go to Section C
     從未參與任何培訓, 請到丙部

3. The training was organized by: 培訓主辦是由
   - ☐ Current employer 現職僱主
   - ☐ Previous employer 以往僱主
   - ☐ Myself 本人

4. How long ago did you obtain your certificate in food hygiene and safety?
   你在何時獲取食物衛生及安全証書?
   - ☐ Less than 1 year ago 不足 1 年前
   - ☐ Between 1-3 years ago 1 年至 3 年前
   - ☐ Between 3-5 years ago 3 年至 5 年前
   - ☐ Over 5 years ago 5 年多前

5. What type of non-certified food hygiene and safety training did you participate?
   你曾參與哪種非認證培訓?
   - ☐ Company's orientation
     公司迎新活動
   - ☐ Briefing by manager/supervisor
     由經理/督導員簡介
   - ☐ Food hygiene and safety workshops and seminars.
     參加食物衛生與安全工作坊及研討會
   - ☐ Food hygiene classes during college/university study.
     那是我修讀學院/大學課程內的課堂部分
   - ☐ Work experiences gained from the foodservice industry.
     在膳食物服務業的工作經驗中獲得有關知識
   - ☐ Other methods, please specify: _____
     其他方法，請註明： _____

6. When was the last time you took part in non-certified training?
你上次參與非認證培訓是何時?
☐ Less than 1 year ago 不足 1 年前
☐ Between 1-3 years ago 1 年至 3 年前
☐ Between 3-5 years ago 3 年至 5 年前
☐ Over 5 years ago 5 年多前

(*FEHD = Food and Environmental Hygiene Department,食環署 = 食物環境衛生署)

Section C: Evaluation of Your Food Hygiene Experience and Practice
丙部：評估你的食物衛生經驗與操守

The statements below describe the impact of your character, training and the work environment on your experience and practice of food hygiene in the workplace. Based on your most recent work experience, please circle the number that best matches your level of agreement with the statements where 1 = strongly disagree and 7 = strongly agree.
以下各項陳述，旨在描寫你的性格、所接受培訓及工作環境對於你在工作間實踐食物衛生的操守與經驗。請基於你最近的工作經驗，圈出你心目中同意該陳述的程度，1 = 極不同意，7 = 極同意。

Factors 因素	Strongly disagree 極不同意	Disagree 不同意	Somewhat disagree 不太同意	Neutral 中立	Somewhat agree 頗同意	Agree 同意	Strongly agree 極同意
C1. It is my responsibility to practice food hygiene at work 我有責任於工作上實踐食物衛生措施。	1	2	3	4	5	6	7
T1. The relevance of food hygiene and safety training materials helped me understand and become engaged in food hygiene. 相關的食物衛生及安全培訓有助我明白及參與食物衛生。	1	2	3	4	5	6	7
E1. The company provides resources for me to practice food hygiene and safety. 公司為我提供資源，讓我能夠運用所學的技巧。	1	2	3	4	5	6	7

Section D: Your Food Hygiene Knowledge
丁部：你的食物衛生知識

Based on your KNOWLEDGE in food hygiene, please indicate the effectiveness of these practices in preventing foodborne illnesses. Circle the number that best reflects your level of agreement with the statements where 1 = strongly disagree and 7 = strongly agree.
根據你的食物衛生知識，請指出操守的有效性以預防食物性疾病。請圈出最佳反映你對該陳述的同意程度。1 - 極不同意， 7- 極同意。

Knowledge Statements 知識陳述	Strongly disagree 極不同意	Disagree 不同意	Somewhat disagree 不太同意	Neutral 中立	Somewhat agree 頗同意	Agree 同意	Strongly agree 極同意
P1. Washing hands in cold water before handling food will completely eliminate the risk of food contamination. 處理食物前用凍水清洗雙手，可完全消除食物受到污染的風險。	1	2	3	4	5	6	7
P2. There is no risk of food contamination from open cuts or sores on the hand. 手上切割的傷口或瘡膿不會令食物受到污染。	1	2	3	4	5	6	7
C1. Food contact surfaces used alternately without cleaning to prepare raw and ready to eat foods will not contaminate food. 互相使用後的食物接觸面沒有清潔而用來處理生食物, 不會污染食物。	1	2	3	4	5	6	7
C2. Raw and cooked foods must be handled separately to avoid cross contamination. 生熟食物必須分開處理，以免交叉污染。	1	2	3	4	5	6	7
T1. Correct temperature control for handling of raw foods is more important than cooked foods to avoid contamination. 正確溫度控制對處理生食物較熟食是相對重要, 以預防食物污染。	1	2	3	4	5	6	7
T2. Food that has been thawed can be refrozen again without any risk of contamination. 解凍後的食物再急凍是不會有污染的風險。	1	2	3	4	5	6	7
S1. The use of fresh raw eggs in recipes that are not cooked will not lead to food contamination. 使用生雞蛋在菜單中不會導致食物污染。	1	2	3	4	5	6	7
S2. Pasteurization of milk and juice helps to prevent foodborne illness. 牛奶與果汁經巴士德消毒後，有助預防食物傳播的疾病。	1	2	3	4	5	6	7

Section E: Your Food Hygiene Attitude
戊部：你的食物衛生態度

Based on your BELIEFS in food hygiene, how do you feel about these practices effectiveness in preventing food contamination in the workplace. Circle the number that best matches your level of agreement with the statements where 1 = strongly disagree and 7 = strongly agree.
根據你的食物衛生信念，你會覺得以下操守的有效性, 以預防在工作間食物污染。請圈出最佳反映你對該陳述的同意程度。1 - 極不同意， 7- 極同意。

Attitude Statements 態度陳述	Strongly Disagree 極不同意	Disagree 不同意	Somewhat Disagree 不太同意	Neutral 中立	Somewhat Agree 頗同意	Agree 同意	Strongly Agree 極同意
P1. I believe that properly washing hands on a regular basis will reduce the risk of food contamination. 我相信經常適當地清洗雙手，可以減低食物受到污染的風險。	1	2	3	4	5	6	7
P2. It is not necessary to cover a cut or sore on my hand before I prepare food. 在準備食物前，我無須把手上的傷口或瘡腫覆蓋起來。	1	2	3	4	5	6	7
C1. Cleaning and sanitizing all food contact surfaces helps to eliminate cross-contamination. 把所有食物接觸表面清潔消毒，有助消除交叉感染的機會。	1	2	3	4	5	6	7
C2. I think raw and cooked foods must be handled separately to avoid cross contamination. 我認為生熟食物必須分開處理以預防交叉污染。	1	2	3	4	5	6	7
T1. Thawing frozen food at room temperature will not lead to cross contamination. 在室温解凍急凍食物不會導致交叉污染。	1	2	3	4	5	6	7
T2. Reheating of cooked or previously prepared foods is not a major concern in food safety. 翻熱已烹煮或預先準備的食物不是食物衛生的主要憂慮。	1	2	3	4	5	6	7
S1. I believe lightly cooked eggs will not contribute to food poisoning 我相信把雞蛋稍加烹煮即給予客人享用未必促成食物中毒。	1	2	3	4	5	6	7
S2. Serving food that is rare or underdone is undesirable. 奉上半熟或是未經煎煮的食物是不能接受的。	1	2	3	4	5	6	7

Section F: Your Food Hygiene Behaviour
己部：你的食物衛生行為

Below is a list of statements which describe food hygiene behaviours in the workplace. Based on your CURRENT job position, please indicate how often you practise these behaviours when performing your duties in the workplace where 1 = not at all likely and 7 = extremely likely. Please circle the number that best matches your level of agreement.
以下一系列陳述，旨在描寫你工作期間有關食物衛生的行為。請基於你現職的工作，指出你在工作期間履行職務時作出那些行為的頻密程度，1 = 絕不可能及 7 = 絕大可能。請圈出你心目中同意該陳述的程度。

Behaviour Statements 行為陳述	Not at all likely 完全沒有可能	Very unlikely 非常沒有可能	Somewhat unlikely 不大可能	Neutral 中立	Somewhat likely 有可能	Very likely 非常有可能	Extremely likely 極其有可能
P1. I wash my hands with soap and water before starting to prepare food. 開始準備食物之前，我以肥皂及水清洗雙手。	1	2	3	4	5	6	7
P2. If I have a cut or sore on my hand, I cover it before preparing food. 若然手上有傷口或瘡腫，我會於準備食物前將傷口覆蓋。	1	2	3	4	5	6	7
C1. I clean and sanitize all food contact surfaces between preparation of raw and ready-to-eat foods. 交替準備生熟食物之間，我會清潔和消毒所有食物接觸表面。	1	2	3	4	5	6	7
C2. I separate raw food from ready to eat foods 我會把生熟食物分開。	1	2	3	4	5	6	7
T1. I leave frozen foods to thaw at room temperature. 我會把冷凍食物在室溫解凍。	1	2	3	4	5	6	7
T2. I check the temperature of food at the completion of reheating. 食物加熱完畢之際，我會檢查食物的溫度。	1	2	3	4	5	6	7
S1. I check whether food is cooked by feeling it and looking at its appearance. 我會觸碰並觀察食物的外觀，由此判斷食物是否煮熟。	1	2	3	4	5	6	7
S2. When I am in doubt about the safety of a previously cooked food I throw it out rather than serve it. 若然對於早前烹煮食物的安全存疑，我會把它棄掉，不會保留。	1	2	3	4	5	6	7

Section G: Facilitators and Barriers of Food Hygiene and Safety
庚部：促進和有礙食物衛生與安全實踐的因素

Please rate the item's level of importance in helping you learn food hygiene and safety.
請評價每個項目對你幫助學習食物衛生及安全的重要性。

	Not at all important 毫不重要	Important 重要	Extremely important 十分重要
1. FEHD resources 食物及環境衛生部門的資源	1	2	3
2. Industry/trade associations (e.g. hotel association, restaurant association)業界/僱主協會(例如酒店業協會、飲食業協會)	1	2	3
3. Internet 互聯網	1	2	3
4. TV/radio advertising 電視/電台廣告	1	2	3
5. On the job work experience 在職工作經驗	1	2	3
6. Training courses 培訓課程	1	2	3

Please rate the impact of the items below in preventing you from practising food hygiene.
請評價每個項目防礙你對實施食物衛生的的影響力。

	Not at all significant 毫不顯著	Significant 顯著	Extremely significant 十分顯著
7. Time constraints 時間所限	1	2	3
8. Inadequate training 培訓不足	1	2	3
9. Insufficient knowledge 知識不足	1	2	3
10. Insufficient staff 人手不足	1	2	3
11. Management are not concerned 管理層漠不關心	1	2	3
12. Physical facility constraints 硬體設備限制	1	2	3

This is the end of the questionnaire
問卷完結
Thank you for your participation
謝謝參與

VITA

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